

MODERN

November, 1948

Machine Shop

TECHNOLOGY DEPARTMENT

NOV 9 - 1948

T - TROIT

**"ROCKWELL"
HARDNESS TESTER**
Made Only by Wilson

**DELIVERY
FROM STOCK**



WILSON

MECHANICAL INSTRUMENT CO., INC.

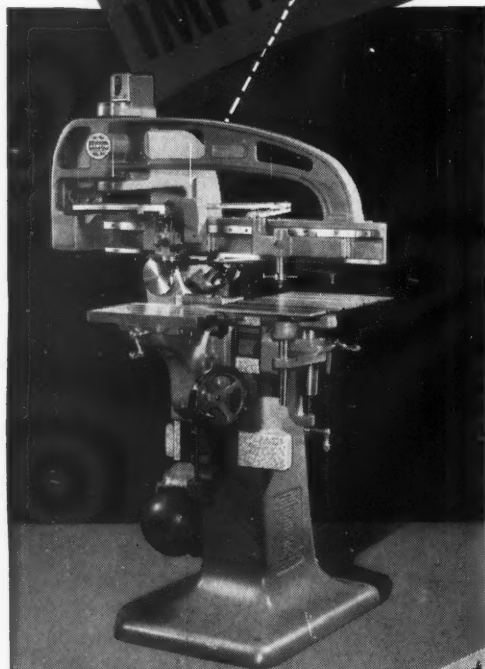
AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.

230 G PARK AVENUE NEW YORK 17 N. Y.

ACCO



Announcing
A BASIC DESIGN
IMPROVEMENT



GEORGE



GORTON
MACHINE CO.

EST. 1880 BY GEORGE GORTON



The New Gorton *RATIOBAR 3-Dimensional Pantograph for Light Milling and Engraving

This revolutionary machine features the new and exclusive *RATIOBAR Tracer Control—the first basic design improvement in pantograph construction since the first pantograph was built. Manufacturers of small intricate dies, molds, hubs, stamps and other related products placed firm orders sufficient to take all of the first production run after inspecting the pilot model! — real proof of the value built into the P13

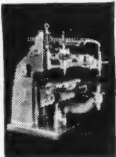
What is *RATIOBAR tracer Control?

*RATIOBAR Tracer Control is the name for the newly developed principal of control, found only on the Gorton P13. It does three important things: permanently aligns the pivot center, cutter spindle and tracing style in an absolute straight line without guessing or innumerable adjustments; enables the operator to set reduction ratios with just one slider block; it provides rigid support for all pantograph linkages. No other manufacturer offers these advantages in a pantograph.

Easier operation and better balance are also assured with the *RATIOBAR because linkage move toward the pivot center as the tracer moves out and away from it. For detailed information, use coupon below.

OTHER MODELS FOR OTHER WORK

The new Gorton P13 is just one of a family of cost-cutting, precision pantographs. Your requirements may call for the 3-L — largest 3-Dimensional Pantograph available today, the 3-U or 3-Z for light or medium milling and engraving in 2 dimensions, or you may require special adaptations or tooling. Our Engineering Service is ready to serve you without obligation.



FREE... COMPLETE INFORMATION. Date on the new Gorton P13 as well as other Gorton pantographs. Write for Bulletin 1580 today.

Pats. Applied For*

PLEASE SEND WITHOUT OBLIGATION
Bulletin No. 1580 - 1711

Name.....
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Position.....
Address.....
City..... State.....

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NOVEMBER, 1948

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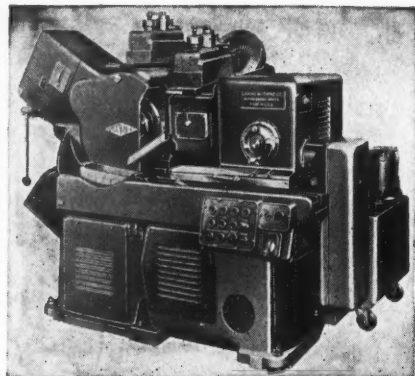
MODERN Machine Shop

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5,700 Set Screws Threaded Every Hour



Automatic thrufeed grinding particularly fits the Landis No. 1 Centerless Thread Grinder for mass production operations. Here, threads are ground to standard tolerances on 5,700 $\frac{1}{4}$ " by $\frac{1}{8}$ " 20 pitch hollow head set screws per hour. Blanks are hopper-fed, finished parts are ejected into trays. Grinding wheel crushings are infrequent—an average of 40 continuous production hours between wheel crushings. This machine is also used for infeed grinding of headed or shouldered pieces. Diametrical capacity, thrufeed or plunge cut, is $\frac{1}{8}$ " to $4\frac{3}{4}$ ". Write for Bulletin E-97.

LANDIS
Machine
COMPANY
WAYNESBORO • PENNSYLVANIA

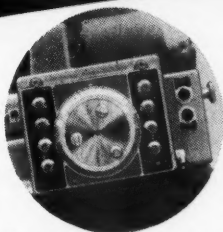
NEW HEALD

INTERNAL GRINDING MACHINES

Easy

TO SET UP...

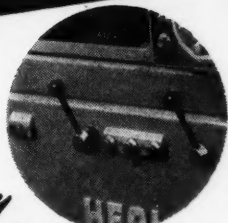
quick, accurate dial feed settings



Easy

TO OPERATE...

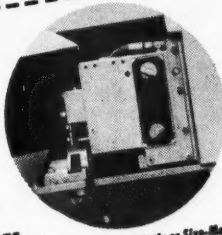
convenient, centralized controls



Easy

TO HOLD SIZE...

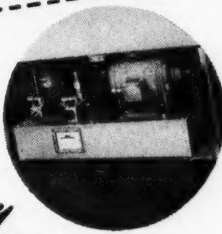
automatic, uniform size control with Gage-Matic or Size-Matic sizing



Easy

TO SERVICE...

accessible, roll-out hydraulic unit



and... *Easy on Costs!*

Every feature of the new Heald Internal Grinding Machines is designed to help you turn out better work—easier, faster and at lower costs. All together, they represent the greatest advance in precision grinding technique ever available to industry.

Besides the features shown, new Heald Internals provide uniform, preset feeds that remain constant regardless of temperature changes; isolated hydraulic unit preventing transmission of accuracy-destroying heat and vibration; improved cylinder and piston design; automatic lubrication; universal valve manifold; leak-proof flared steel tubing; permanently-lubricated cool-running wheelheads; more rigid workheads.

These new Heald Internals can give you a new conception of precision and low costs in internal grinding... and they're built in a complete range of sizes in Chucker and Centerless models to meet your requirements. We invite you to get complete information from your Heald Representative, or contact Worcester direct.



THE HEALD MACHINE COMPANY, Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York



Heald Model 271
Gage-Matic

**Decidedly
FINER!**

**OUTSTANDING VALUE
in the MEDIUM-PRICE
FIELD**

TIMKEN
BEARINGS
ON ALL
SHAFTS IN
HEADSTOCK

OVERSIZED
HEAT-TREATED
STEEL GEARS
IN
HEADSTOCK

ACCURACY
.0005"
AT EVERY
POINT OF
ALIGNMENT



APRON
CONTROL FOR
START, STOP
AND REVERSE
OF SPINDLE

REVERSE IN
APRON
FOR FEEDS

57 FEED
AND THREAD
CHANGES

**GENERAL PURPOSE
LATHES**

Made in 12", 16" and
20" sizes. (16" shown here) **TAPER GIBS**

Sebastian GEARED HEAD LATHES

The Sebastian Lathe has long enjoyed a high reputation. Today—built in the modern King plant, with advantages of King engineering skill and advanced production facilities—the Sebastian is an even *finer* lathe than ever before.

Here's more lathe for your money . . . more in accuracy, in operating ease, in

Now Manufactured By



**BUILDERS OF
WORLD-RENOWNED "KING"
BORING & TURNING MACHINES**

longer service life. The Sebastian Lathe has all the features of large, high-priced production lathes.

Many important items are supplied as standard equipment, included in basic lathe price—*more than with any other lathe of its type.*

See your nearest Sebastian dealer. And write now for new Sebastian Bulletin.

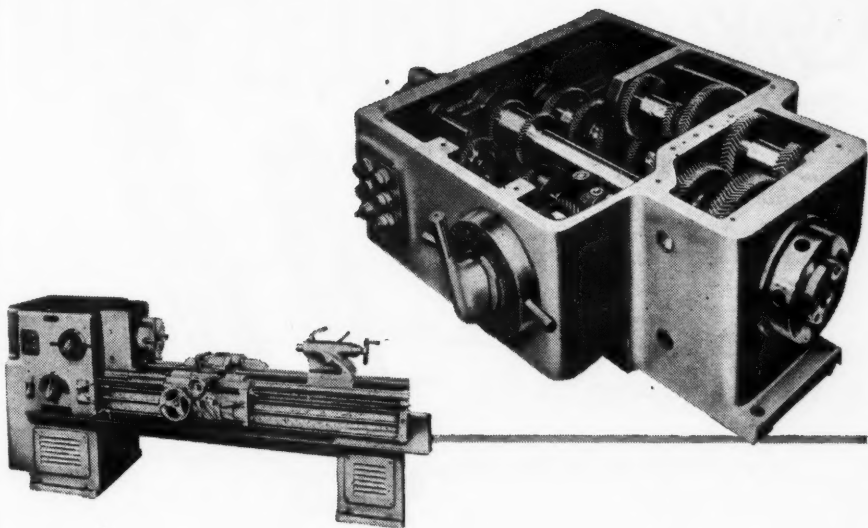
GAP LATHES also available, in 16" and 20" sizes.
All Sebastian Lathes are equipped with 8-speed geared heads.

American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of Vertical Boring & Turning Machines and Sebastian Lathes



THESE PC* GEARS PROVIDE "a smoother rolling action"

The Sidney Machine Tool Company first started using Farrel-Sykes, continuous tooth, herringbone gears in their lathes some twenty years ago. In their own words:

"PRECISION CUT by the famous Farrel-Sykes process of gear generation.

"... We have met with considerable success in their use, and especially so in the last years when so many manufacturers have turned to the use of carbide-tipped cutters, as we find in this transmission a smoother rolling action which materially prolongs the life of carbide-tipped cutters. We employ this type of transmission throughout our entire line of 16-speed and 32-speed lathes."

Farrel-Sykes, continuous tooth, herringbone gears are available to you, too, in any size up to 20 feet in diameter, for practically any application. Information and engineering assistance available, without obligation.

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Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston.



Farrel-Birmingham

FB-452

Who says:
"A TAP IS A TAP ?"



We can't go along with that statement. It's like saying, "A book is a book" . . . (or, closer to home) "A machinist is a machinist."

If you believe that all engineers, machinists, machines, steels, coolants, inspectors, etc. are alike . . . then you might say, "A tap is a tap." But at Hanson-Whitney we know better. So do the thousands of buyers of H-W Taps . . . many of whom have been repeating customers since we

pioneered the "finished" tap . . . threads ground after hardening.

H-W Taps are the result of the closest control over materials, men, and machines . . . control that has been evolved through many years of leadership in supplying the right tap for the specific job.

So . . . let's not say, "A tap is a tap" . . . let's say an H-W Tap is a tap of the highest quality, measured, of course, by the number of holes tapped per grind.

HANSON-WHITNEY MACHINE CO. HARTFORD 2, CONN.
Division of Whitney-Hanson Industries, Inc.

**Hanson
Whitney**

For practical recommendations submit your problems to Hanson-Whitney engineers.

PIONEERS OF FINISHED TAPS

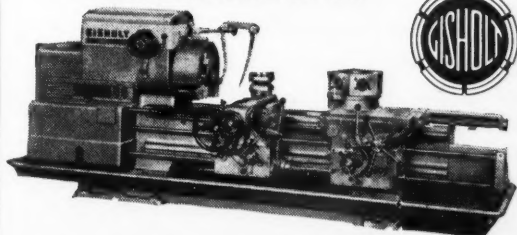
How Hard *are GISHOLT'S* *Hardened Ways?*

to show you . . .
*We took a section from
the bedways . . .*

made it into a tool bit . . .

Here it is, turning a shaft of 1045 cold rolled steel. This illustrates how precision is "hardened" into Gisholt Turret Lathes with all working surfaces hardened to 64-66 Rockwell C on ways, gibs and clamps. This extreme hardness makes Gisholt ways practically wearproof—insures life-long accuracy—the kind of accuracy you want specified in your next turret lathe.

GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN



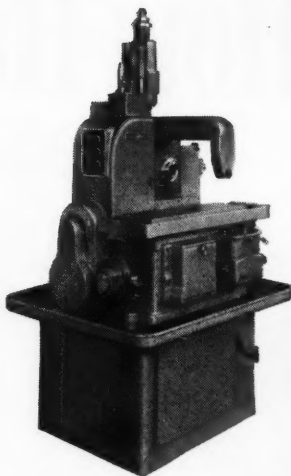
and cut metal with it!



**TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS
BALANCERS • SPECIAL MACHINES**



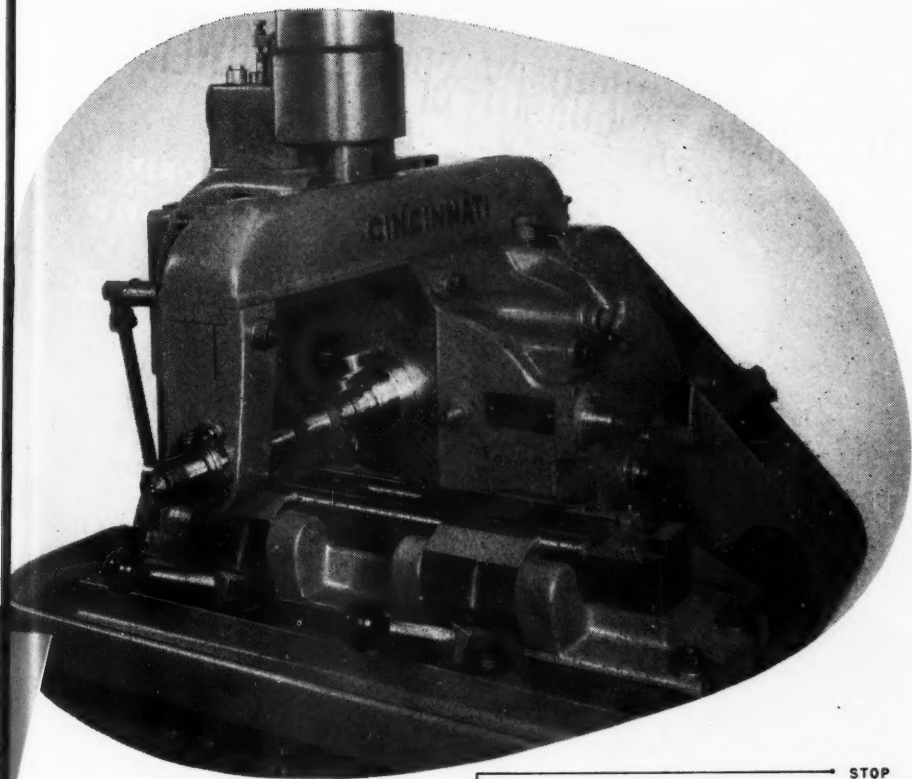
IT SAVES TIME



CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine. Complete specifications may be obtained by writing for catalog M-1607.

BY AUTOMATICALLY JUMPING OBSTRUCTIONS

● Grade school boys always take the shortest distance between two points . . . race over lawns, jump over hedges, climb over or under fences. For them it's so much easier. The same dexterity can be employed to advantage in many milling operations. CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machines supply the dexterity by jumping over obstructions in the way of milled surfaces; save time by combining operations. ¶ The illustration above shows how this timesaving automatic feature—mill, jump over space, mill—is employed in milling two short keyways in a shaft. To reduce the cost still further, Cincinnati Application Engineers designed the fixture to hold two parts. Inexpensive "cycle selectors" (they can be interchanged in less than a minute) coordinate the longitudinal and vertical traverse movements. ¶ CINCINNATI No. 0-8 Rise and Falls can be employed in other ways, too: for conventional straightaway milling cuts, to retract the cutter on the return stroke and save the finish. Catalog M-1607 gives additional data. Brief specifications in Sweet's Catalog File for Mechanical Industries.



PRODUCTION DATA

Part name.....Shaft
Material.....SAE 1112 steel
Operation.....Mill two keyways
Spindle speed.....117 rpm
Table feed.....10 in./min.
Production.....104 per hour
Equipment—CINCINNATI No. 0-8 Rise and Fall Milling Machine equipped by Cincinnati Application Engineers.



Drawing of the part, and diagram of the automatic cycle employed in milling two short keyways in one setting.

CYCLE

Lower carrier
 Feed table right
 Raise carrier
 Rapid advance table
 right
 Feed table right to
 accurate location

Lower carrier
 Feed table right
 Raise carrier
 Rapid return table
 left
 Stop

THE CINCINNATI MILLING MACHINE CO.

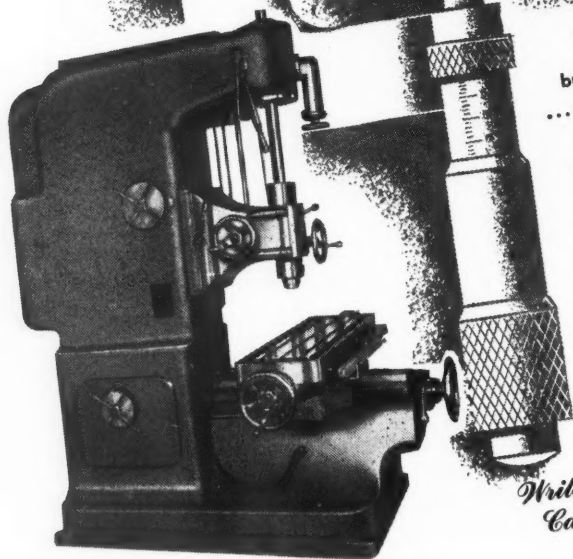
CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
 FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

EXCEPTIONAL ACCURACY, SPEED AND POWER

No. 50 PRECISION BORING AND VERTICAL MILLING MACHINE

- ★ Reduces Set-Up Time To A Minimum
- ★ Eliminates Time-Wasting Work Transfers
- ★ Multiple Operation On A Single Machine
- ★ Greater Output At Lower Unit Cost



The No. 50 is a machine built for precision as well as speed ... with unusual ability to handle an extreme range of different and difficult jobs. Simple and convenient to operate — ruggedly constructed for many years of tough, trouble-free service — the Knight Miller offers worthwhile savings in greater output, lower production costs and improved quality of work.

*Write for Complete
Catalog Details*

Sixteen spindle speeds, 40 to 2,000 r.p.m. • 9 spindle feeds, .005" to .010" • 100" table traverse per minute in both directions • 16 table feeds, $\frac{1}{16}$ " to 20" per minute • $7\frac{1}{2}$ h.p. drive.

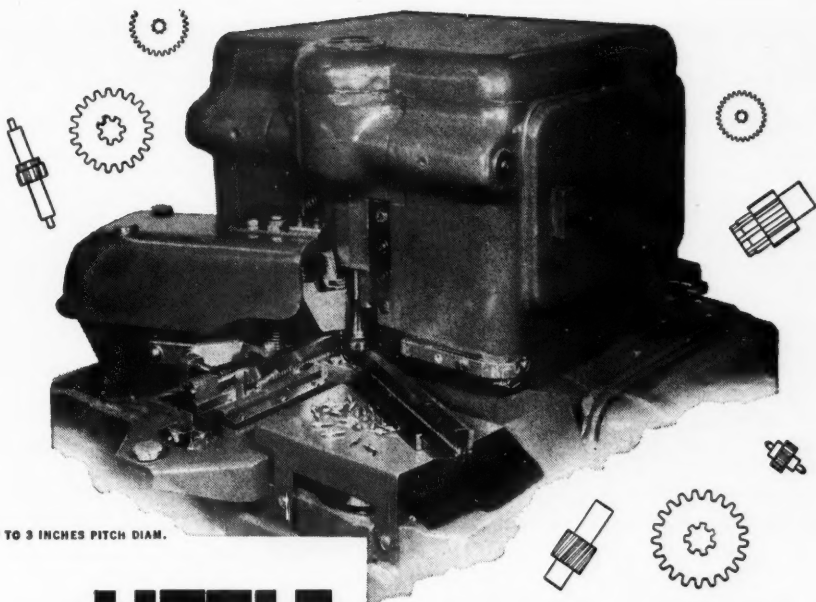


W.B. KNIGHT

MACHINERY COMPANY

MORE GOODS for MORE PEOPLE at LOWER COST

3920 WEST PINE BLVD. • ST. LOUIS 8, MISSOURI



UP TO 3 INCHES PITCH DIAM.

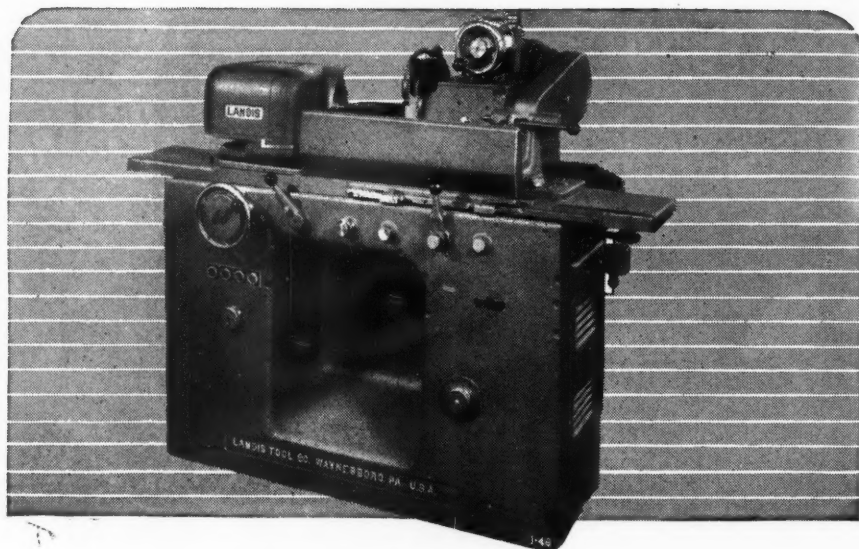
LITTLE GEARS

**Fast, Accurate
and at Low
Cost**

Small, fine-pitch gears, pinions, and precision instrument parts, can be mass-produced on the Fellows Fine-Pitch Gear Shaper with duplicated accuracy. Ganging of work on arbors, and fast-operating magazine feed, opens new possibilities for small parts production. Generating on the Gear Shaper can contribute to the quiet smooth operation of many precision devices. Descriptive literature on request.

Fellows

The Fellows Gear Shaper Co., Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Building, Detroit 2; 640 West Town Office Building, Chicago 12; 7706 Empire State Building, New York 1.



GRINDER COST or GRINDING COST?

In precision tool room and production work

When you use a Landis Tool grinder for tool room or production precision grinding, its plus features pay big dividends in reduced grinding costs.

You get so much more for the small cost of a Landis Tool grinder. For the machine illustrated, plus features include convenient operator controls, hydraulic table traverse, hydraulic automatic wheel feed, adjustable speed motor driven headstock.

10" x 20" Type H Hydraulic Universal (catalog I-145)

Work swing	10 $\frac{3}{4}$ "	Grinding wheel size	10" x 1 $\frac{1}{2}$ " x 3"
Traverse speed	3"-120"/min.	Work Speeds	90 - 600 r.p.m.
Maximum taper	3"/ft.	Floor space	50" x 85"

Free help for grinder operators—Send for illustrated book "Better Grinding."

World's Largest Manufacturer of Precision Grinders Exclusively

LANDIS TOOL
Precision Grinders

LANDIS TOOL COMPANY, 16 EAST 6TH ST., WAYNESBORO, PENNA.

Stainless Steel Pipe Lines

Right Off the Shelf!

Whether you use it to handle chemicals . . . food . . . or dairy products . . . you'll find everything you need for that stainless pipe line right in Frasse warehouse stock.

Stainless pipe? Frasse stocks it in seamless or welded, standard or extra heavy—and in a complete range of sizes. You can choose the analysis, too—type 304, type 316 for severe corrosive conditions, or type 347 for high temperature use. All are on hand for immediate delivery.

Valves and fittings are equally handy. Frasse stocks stainless gate and globe valves, nipples, elbows, couplings, tees, unions—everything you need to hook up a new line, or replace a section.

It's convenient to work with the range and variety in Frasse stocks—and the quick delivery helps you get the job done. Whenever the layout calls for stainless—call Frasse. Peter A. Frasse and Co., Inc., 17 Grand Street, New York 13, N. Y. (Walker 5-2200) • 3911 Wissahickon Avenue, Philadelphia 29, Pa. (Baldwin 9-9900) • 50 Exchange Street, Buffalo 3, N. Y. (Washington 2000) • Jersey City • Syracuse • Hartford • Rochester • Baltimore

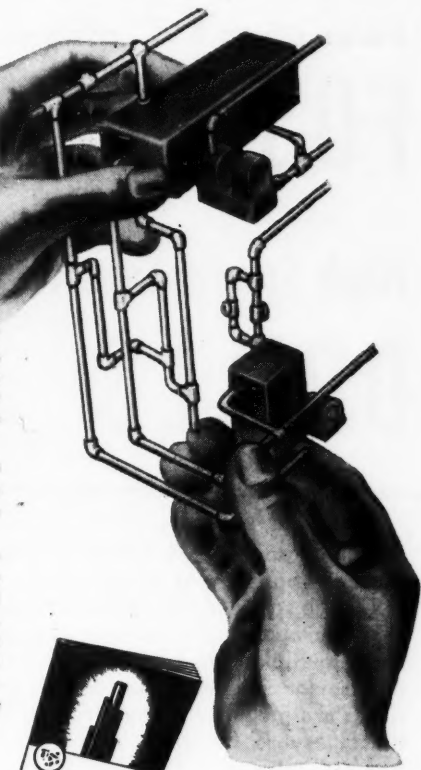
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Stainless Tubing, Pipe, Valves and Fittings



64MA

Peter A. Frasse and Co., Inc.
17 Grand Street, New York 13, N. Y.

Please send me a complimentary copy of your new stainless tube and pipe manual.

Name.....Title.....

Firm.....

Address.....

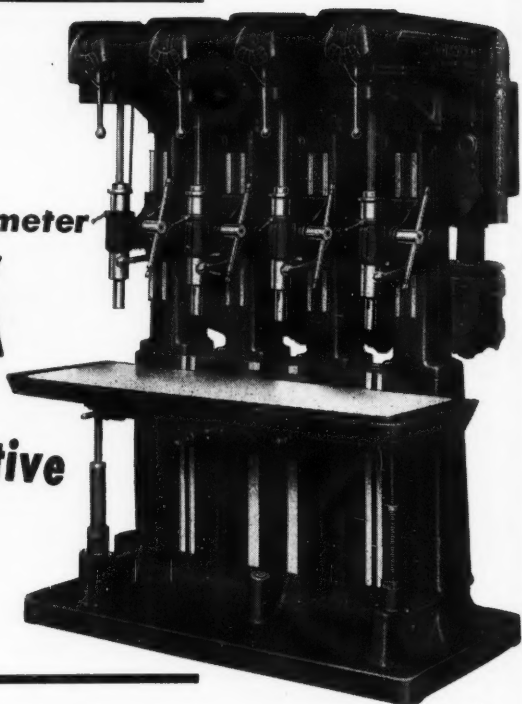
**FOR DRILLING . . .
REAMING . . .
TAPPING**

holes up to 1 1/2" diameter

FOSDICK

High Speed Sensitive

DRILLS



This Fosdick High Speed Sensitive has proved most popular for drilling, reaming, boring and tapping holes up to 1 1/2" diameter.

Single speed motors with complete controls are furnished with the machine. It is available in any number of spindles up to six. Spindles are designed to carry multiple drill heads. Addition of an extra contractor provides spindle reverse for tapping. The drive to spindle is through Vee belts. All revolving shafts are mounted on anti-friction bearings and gears slide on splined shafts. Machines are furnished with box or round columns depending upon your requirements.

This line of Fosdick drills offers exceptional economy for drilling—reaming—facing—and tapping operations on work within its capacity.

**Write for complete details—fully covered in
Fosdick H.S. Bulletin H.S.M.M.S.**

FOSDICK also builds

... a distinctly new Radial Sensitive Drill • Hydraulic Radial Drills • Heavy Duty Upright Drills and Jig Borers.

BULLETINS AVAILABLE—WRITE

FOSDICK

MACHINE TOOL CO.
CINCINNATI 23, OHIO

Jarvis

ROTARY FILES



SERVE ALL INDUSTRIES

Jarvis Rotary Files are ground-from-the-solid to give high speed, precise and economical service. These Jarvis Tungsten carbide files, as well as high speed rotary files are available in over a hundred different shapes and sizes to meet every material requirement. New manufacturing techniques followed in forming blanks and grinding flutes assure quality and performance and keep unit cost at a minimum. Additional economy is provided by Jarvis'

prompt regrinding service available to all users of Jarvis Rotary Files. These files can be accurately reground many times thereby appreciably reducing replacement costs. Coarse, standard, fine and superfine flutings are available from stock.

Jarvis Flexible Shaft Machines provide the ultimate in extra power and constant high speed to make tungsten carbide rotary files even more efficient.

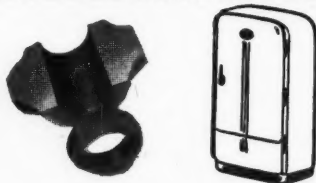
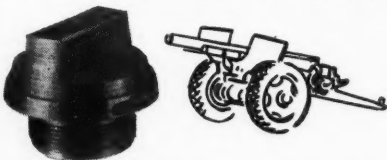
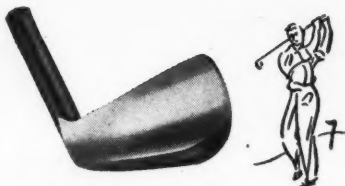
Write for Literature on the quality line of Jarvis Power Tools.

Jarvis

POWER TOOLS

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

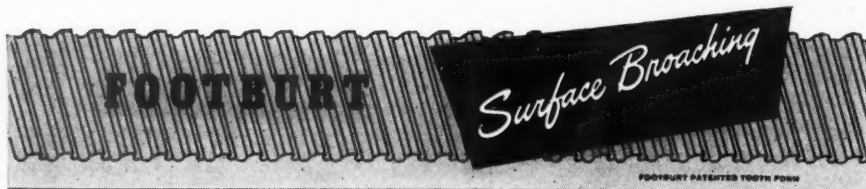
Tapping Attachments • Tecni-Taps and Dies • Rotary Files
Flexible Shafts and Machines • Quick Change Chucks & Collets



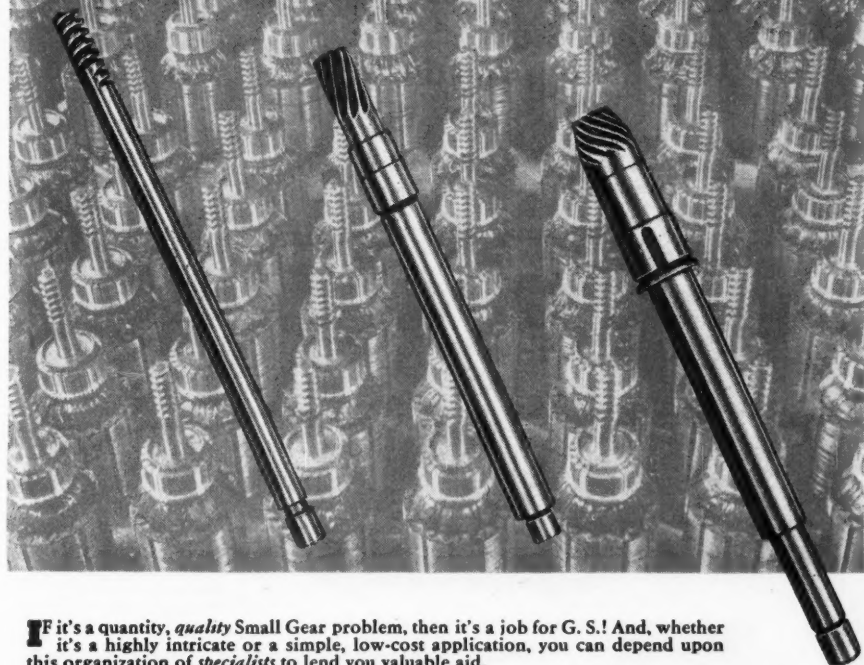
FOR ALL TYPES OF INDUSTRY

Throughout the metal working field there are many parts that can be successfully surface broached—faster, more accurately and at less tool maintenance cost than possible with present methods. We will be glad to work with you on the application of Footburt surface broaching machines on your work. Just write.

THE FOOTE-BURT COMPANY
Cleveland 8, Ohio
Detroit Office: General Motors Building


FOOTBURT PATENTED TOOTH FORM

NEED SMALL GEARS IN BIG QUANTITIES?



If it's a quantity, *quality* Small Gear problem, then it's a job for G. S.! And, whether it's a highly intricate or a simple, low-cost application, you can depend upon this organization of *specialists* to lend you valuable aid.

Problems in (1) design, (2) the selection of the one best material, (3) in methods of mass production to assure greatest possible economy, and (4) in prompt deliveries . . . all these, and more, are determined with a skill that only large capacity and 30 years of specialization can give! Armature Shafts, as pictured here, are only one of the many Fractional Horsepower Gearing applications we produce. Extreme accuracy and uniformity are assured. Try G. S. service. See how speedy and efficient it is . . . how much longer, more *smoothly* your products operate with G. S. Gears. Suggestions, ideas and moderate cost estimates are yours without obligation. Write or phone us today!

SEND FOR *free G. S. catalog-bulletin, describing many different types and applications of our Fractional Horsepower Gears.*



GEAR Specialties

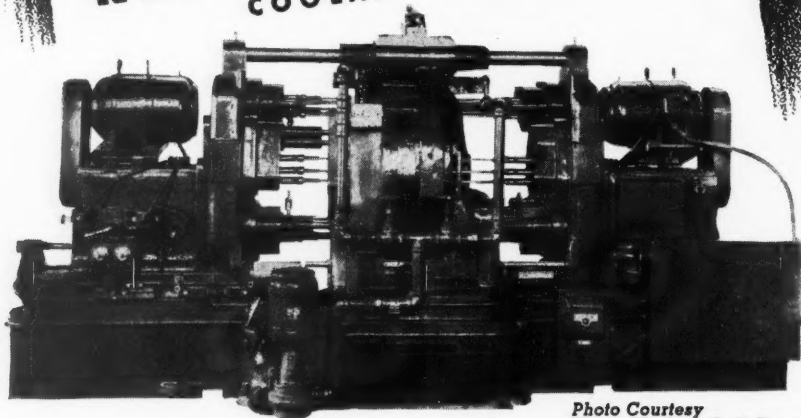
Spurs • Spirals • Helicals • Bevels • Internals • Worm Gearing • Racks • Thread Grinding
2635 WEST MEDILL AVENUE • CHICAGO 47, ILLINOIS

MEMBER OF



WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS

Unexcelled Performance
on all metal cutting operations...
RUTHMAN GUSHER
COOLANT PUMPS



*Photo Courtesy
Morris Machine Tool Company*



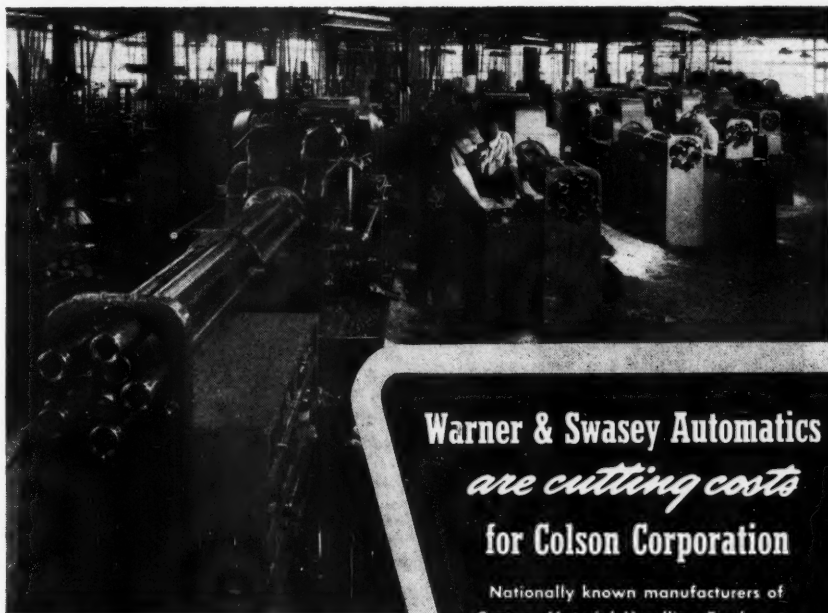
Expertly designed, precision built, Ruthman Gusher Coolant Pumps give year after year of unexcelled performance. Less vibration, fewer parts to wear guarantee a long trouble-free life for Ruthman Gusher Pumps on your metal cutting equipment. Illustrated above is a Morris Two-Way Drilling, Boring, and Reaming Machine with 44 spindles mounted in Cluster Heads; equipped with Model 11024 Short Ruthman Gusher Coolant Pump.

THE RUTHMAN MACHINERY CO.



1817 Reading Road

Cincinnati 2, Ohio



Five of seven Warner & Swasey 5-Spindle Automatic Bar Machines in operation at Colson Corporation, Elyria, Ohio.

Warner & Swasey Automatics
are cutting costs
for Colson Corporation

Nationally known manufacturers of
 Casters, Material Handling Trucks, etc.

THE COLSON STORY

- ★ Setup time-cut more than 50% on new Warner & Swaseys.
- ★ Production up 7 to 8 times on lots of 500 to 10,000 pieces.
- ★ "Progressive" setups are much more practical on Warner & Swaseys.
- ★ Small lots are economically practical on this new CAMLESS Automatic.
- ★ Machine operators appreciate easy access and interchangeability of tooling.
- ★ Both management and operators approve—NO CAMS TO CHANGE.
- ★ Five repeat orders prove the profitability of Warner & Swaseys.



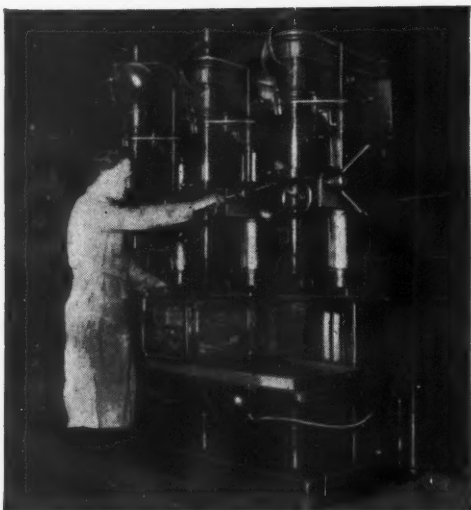
to set up a Warner & Swasey CAMLESS Automatic!

Turret Lathes, Multiple & Single Spindle Automatics, Precision Tapping and Threading Machines.

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FOR LOWER MANUFACTURING COSTS



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Slashing Time and Costs on the **BIG JOBS**

Up to 2" holes in cast iron, 1 1/4" holes in steel! *This "Buffalo" No. 22 Drill is cutting costs!* It's a BIG Drill—97" high with a 1.312" spindle—yet all controls are easy to handle, setup and speed adjustments readily made for drilling or tapping. *Write for Bulletin 2989-E—see what a JOB the "22" can do for you!*

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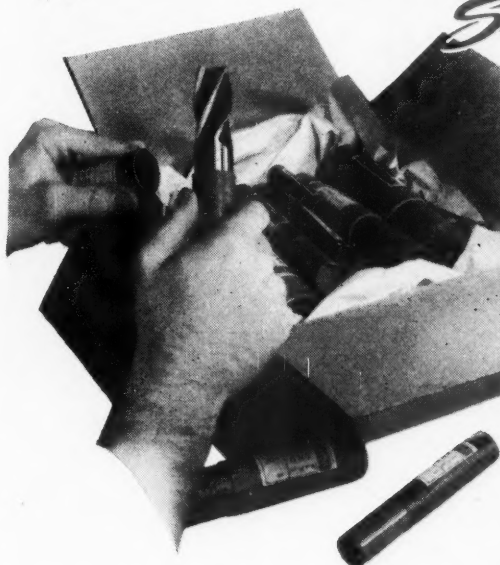
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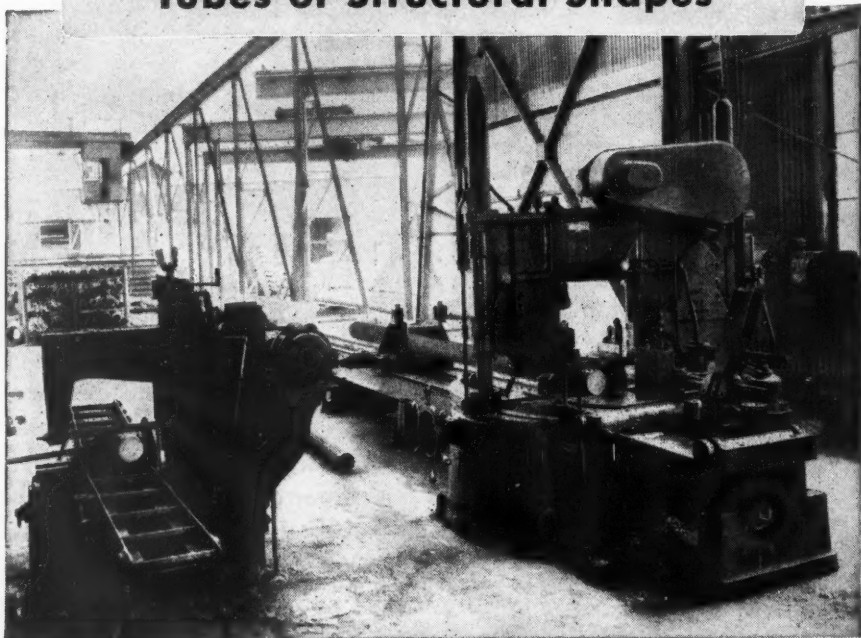
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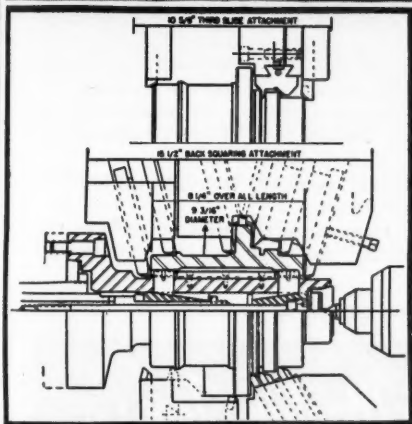
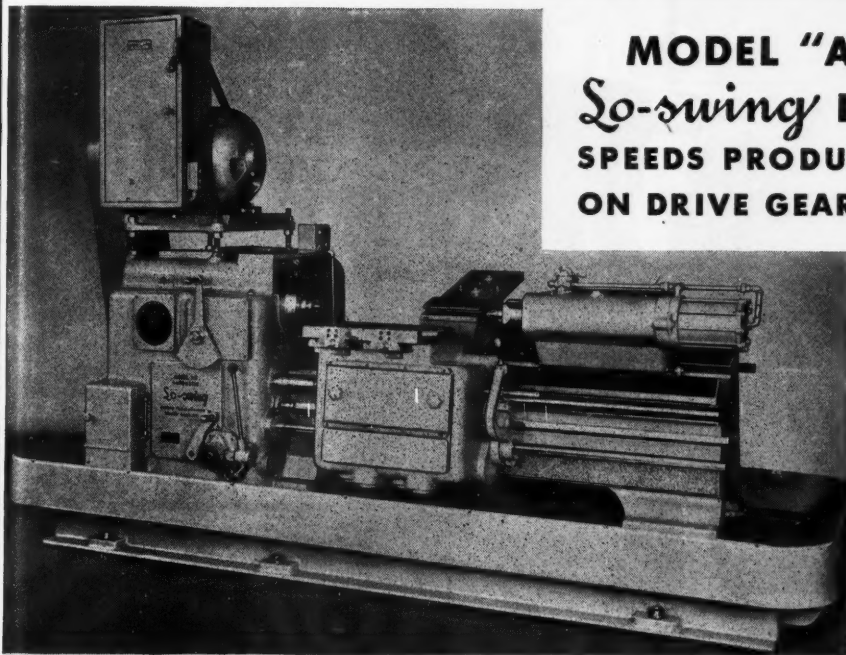
CHICAGO 39, U. S. A.



MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

MODEL "AR" Lo-swingy LATHE SPEEDS PRODUCTION ON DRIVE GEAR HUBS



Problem: To automatically turn, face and chamfer shoulders, and cut groove on Gear Hub with 9" Flange diameter, locating and centering from bottom of spline previously machined.

Solution: The Model "AR" Automatic Lo-swing Lathe was selected for this job due to its rigid construction and its demonstrated fine performance with cemented carbide tools.

The expanding, air-operated driver, shown in the line drawing and the main illustration, is fitted with two sets of six driving jaws which accurately center the part true with the bottom of the splines. The jaws are actuated with two independently-expanding bushings and pull bars which equalize the pressure on both sets of jaws. The parts are located longitudinally on the arbor by an automatic, air-operated locator, which moves forward to the exact locating position when the tailstock spindle is withdrawn and relieves when the spindle is advanced.

All diameters are turned with the tooling mounted on the front carriage slide. The squaring, chamfering and grooving operations are divided between the rear and vertical slides in order to simplify the tooling which is used for several different sizes of hubs. The line drawing shows the tooling in detail.

Consult our Engineering Department for Automatic Lo-swing Lathes engineered for your particular turning problems.

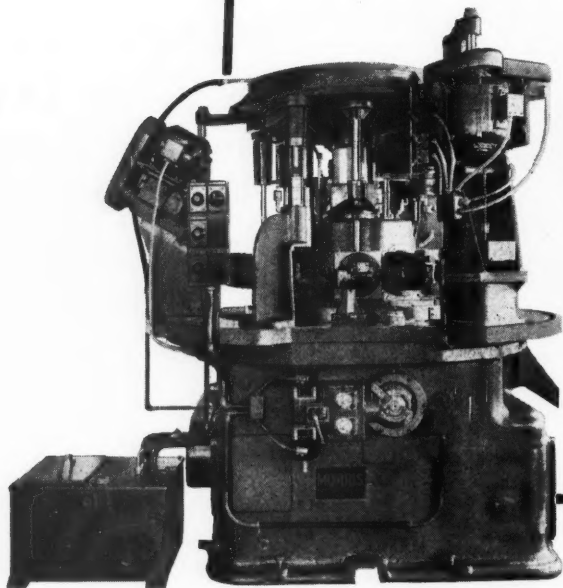
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH S

*Production is Automatic
on this*

MORRIS

**MOR-SPEED
PRODUCTION
MACHINE**



High production and low costs are essential under prevailing conditions today. To help you meet these conditions at favorable costs Morris has developed a line of Mor-Speed Production Machines.

Each machine is designed to handle a specific job and to obtain maximum production. For example the Morris center column machine illustrated performs six operations—drilling—reaming—facing—spot facing—chamfering—and tapping simultaneously on automotive carburetor air horns. Thus producing a finished piece at every index of the fixture holding table.

Production is continuous as the twelve fixtures index automatically and operator unloads finished job and loads new piece at each index of the table.

If you are interested in high production and low costs consult Morris—they have the engineering experience and manufacturing "know-how" to design and build equipment to meet your specific job needs.

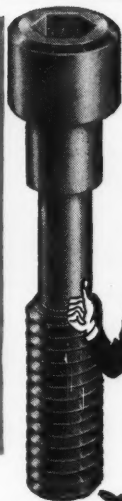
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The MORRIS Machine Tool Co.
CINCINNATI 3, OHIO

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APPLICATIONS"



LEN "IF YOU HAVE
AN ENGINEERING
JOB INVOLVING
FASTENERS"



Buy your precision screws, socket keys, dowel pins and pipe plugs from your Allen dealer and get real service on a line of over 1500 standard items, accepted all over the world as "tops". There's no more respected guarantee of quality than the Allen trade mark.

Write the factory direct for authoritative and imaginative engineering service on fastenings, backed by unmatched breadth of screw manufacturing facilities. Write here, too, for descriptive folders you require.

WARNING

Allen-TYPE screws aren't necessarily Allen-MADE. Be sure to get genuine ALLENS. SOLD ONLY THROUGH LEADING DISTRIBUTORS



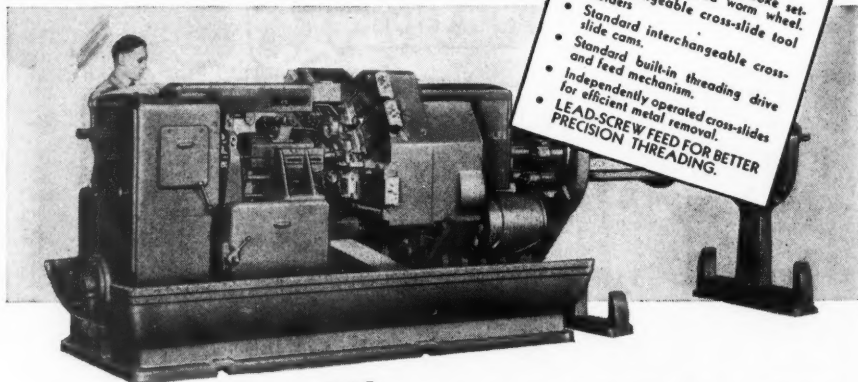
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For continuous use, driving smaller size hex socket screws. Blade adjustable, reversible and renewable. Speeds assembly and cuts cost.

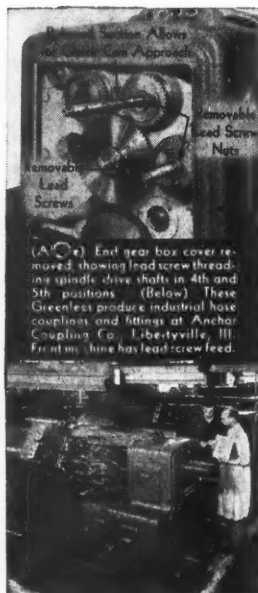
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Hartford 2, Connecticut, U.S.A.
NEW YORK, CLEVELAND, DETROIT, CHICAGO, LOS ANGELES



LEAD-SCREW FEED FOR *Better* PRECISION THREADING....



HAS BEEN ADDED TO THE OUTSTANDING FEATURES OF **GREENLEE "6"** **AUTOMATIC SCREW MACHINES**



Operators on Greenlees have plenty of elbow room to work in the tooling area, for changing tools, making adjustments, checking work during set-up, etc.

Change-overs are speeded by a quick and easy adjustment for the main tool-slide stroke. No cams to struggle with—just a simple setting to make on a graduated worm wheel.

Tool-holders for the cross-slides are interchangeable so any tool fits all cavities.

Feed-setting on cross slides is fast and simple, using standardized and interchangeable cams — any of which will fit any slide.

Cam-controlled threading feed is a *standard built-in feature* on Greenlees, including built-in drive sleeves in four positions.

Cross-slides are independently operated — permitting the set-up man to select from a wide variety of tooling arrangements and make adjustments as necessary.

AND NOW an extra feature to meet modern production demands — **LEAD SCREW FEED** for extra power and precision on threading operations. The mechanism can be added to most existing Greenlees at low cost.

FREE LITERATURE

Learn more about these and many other valuable Greenlee features that make this machine "The Operator's Favorite". Write today for bulletins — ask for Screw Machine Literature.



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MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

The Backstand-Belt Method of Production
Grinding, Polishing and Finishing offers

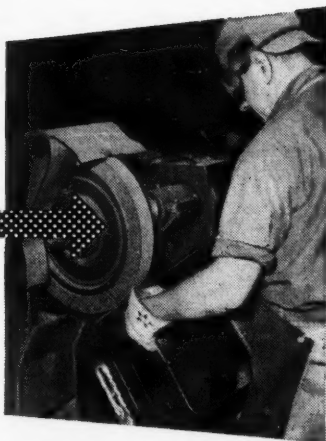
NOT 1 BUT 5 ADVANTAGES

For grinding, polishing and finishing hundreds of consumer and industrial items, the backstand-belt method is more efficient and economical than the older set-up wheel method—because the backstand-belt has these five advantages over the set-up wheel...



1. An abrasive belt is a scientifically made tool, manufactured under controlled conditions by experts using modern making equipment. The photomicrographs compare the crude, uncontrollable rolled-on cutting surface of (a) a typical set-up wheel with (b) the coating on an Armour Abrasive Belt. The sharp cutting points on the factory coated belt are exposed to provide faster, cleaner cutting action, increased production.
2. Coated abrasive belts cut cooler because of a longer interval between work contacts.
3. Inexperienced help can be quickly trained to operate a backstand-belt machine. Highly skilled personnel needed to dress the wheels can be used elsewhere.
4. It takes only a few seconds to change a coated abrasive belt.
5. Temperature-controlled room for curing set-up wheels can be released for other uses.

Actually, there are more than five advantages to the backstand-belt method. For additional information send coupon at left for our new informative booklet—"Facts about Backstand-Belt Grinding and Polishing."



The McCaskey Register Co., manufacturer of cash registers and bookkeeping equipment, improved polishing and deburring time on stamped out register covers 40% by switching to the backstand-belt. Whether you are polishing flat or contoured surfaces, cast, stamped or forged pieces, try backstand-belts.

We recommend buying through your
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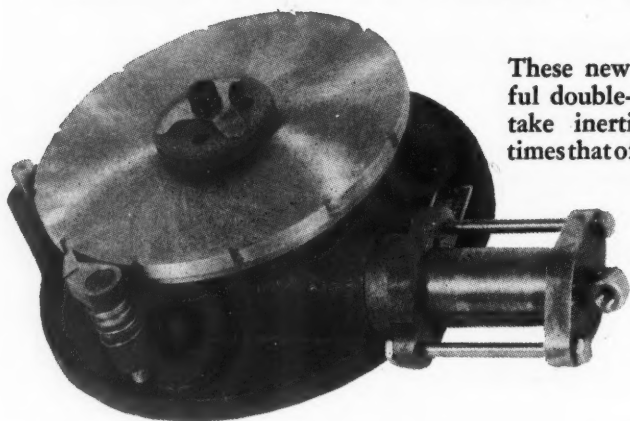
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NEW! MORE POWERFUL!
ALLEN DIAL FEED TABLES



These new tables with powerful double-acting cylinders can take inertia loads over five times that of our former models.

Note These New Features ---

- Micrometric Speed and Power Control
- Dead Lock with High Inertia Loads

AVAILABLE IN TWO SIZES

MODEL 725DA

- 7 $\frac{1}{4}$ " diameter index plate
- 9" diameter base
- 2 $\frac{1}{8}$ " from base to top of index plate
- 1 $\frac{1}{4}$ " double acting cylinder

MODEL 11DA

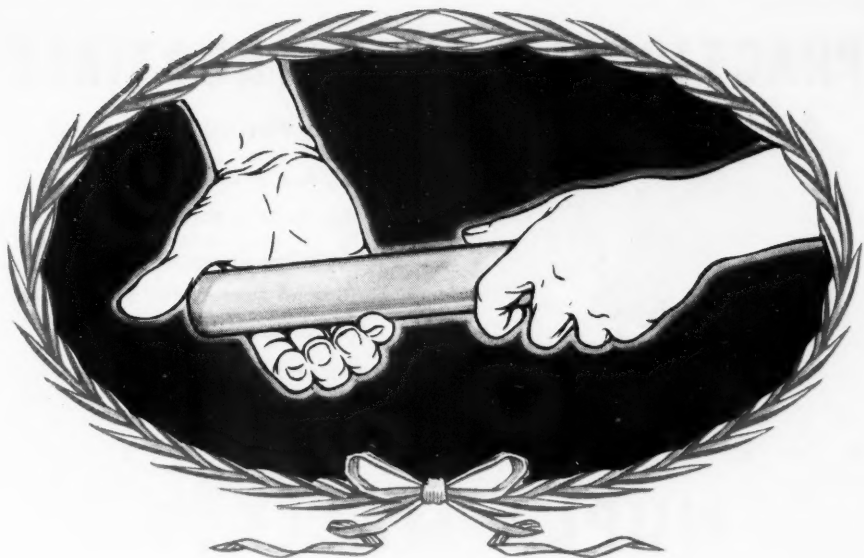
- 11" diameter index plate
- 14" diameter base
- 4" from base to top of index plate
- 2 $\frac{1}{4}$ " double acting cylinder

Model 725DB and Model 11DB have the same physical dimensions as above with the added feature that they will automatically cycle at adjustable speeds from 1 second to 15 seconds per cycle, the table being locked between indexing.

OTHER NEW ITEMS INCLUDE: (1) 3-way pilot valve with adjustable time setting, available normally "off" or normally "on," or without adjustable timer— $\frac{1}{8}$ " NPT ports; (2) 4-way valve of the poppet type with controlled exhausts $\frac{1}{8}$ " NPT ports; (3) 4-way pilot valves with or without adjustable time setting.

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"CARRY ON"

THE LIFE of any business is like a relay race. The business leader is the runner . . . when his race is run, he passes the baton to his team-mate and the race goes on.

☆ Sound businesses are not tied to the life span of any one leader, they "carry on" no matter what individual may pass from the field.

Basic is the rule that there must be another ready to grasp the baton.

☆ K. R. Wilson . . . the founder of this business has passed away.

Within the organization he built are others who have come up to take his place. They will "carry on."

☆ The founder's monument — built over a period of thirty-two years — is the successful business he left as a small contribution to America's future. Mute testimony of this fact can be seen in the many thousands of KRW Hydraulic Presses being profitably operated by Industry today.

☆ Raised in these sound traditions, those who will carry on pledge to maintain the same high standards of quality, engineering and manufacture which they inherited. That, to us, is the best way we know to say good-bye to "The Boss."

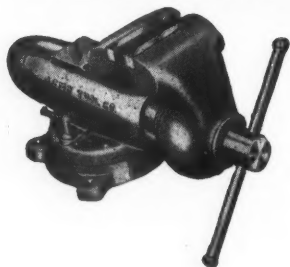
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PRACTICALLY INDESTRUCTIBLE

ACME BENCH VISES have ALL of these features



Maximum Gripping Power • Longer Vise Life

No Side Twist or Wobbling

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11 Sizes from 2" to 6"

Also ACME COMBINATION PIPE AND BENCH VISES
with same outstanding features available in 3½", 4½"
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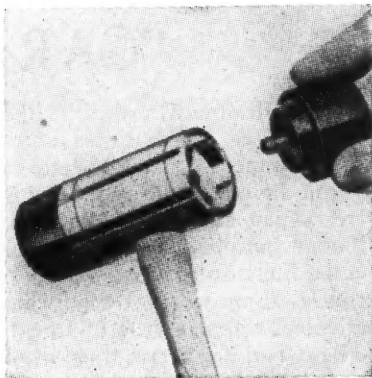
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**with
Interchangeable
Tips**

Nupla Mallet Tips give you tough, resilient and self-healing qualities that no other mallet possesses. Made in three grades:

"S" — Soft, "M" — Medium, "T"—Tough. Also "Nylon Tips."

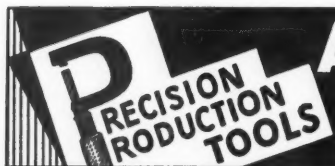


Will not mar machined or delicate surfaces. No "Flying Particles" to endanger workmen's eyes. No sting, vibration or rebound.

No explosion or fire hazard.

Can be had non-conductor of electricity (specify when ordering).

A Mallet for Every Purpose; A Purpose for Every Mallet.



ACME TOOL COMPANY

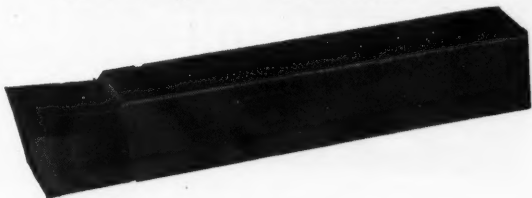
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Made in 2 types — "General Purpose" and "Steel"

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Always tell us the material you are machining.
We will gladly quote you on your special carbide tools.

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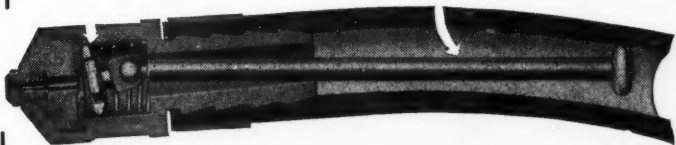
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THE ONLY AIR GUNS WITH ENCLOSED LEVER CONNECTED
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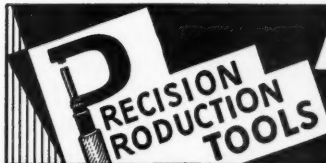
*Valve completely
enclosed. Eliminates
Packing
Glands.*

*Slight movement
of lever gives
complete discharge.*



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- Simple Design
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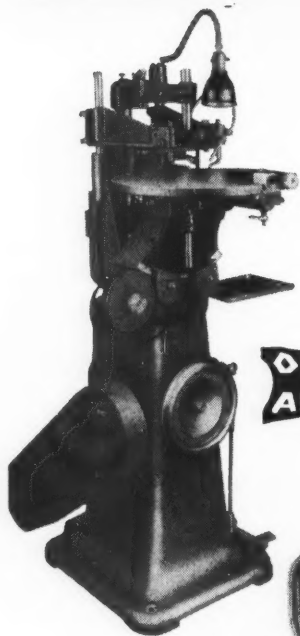
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**BEING OLD-
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**Use the OLIVER
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**IMPROVE YOUR TOOLROOM
IT'S THE BACKBONE
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AUTOMATIC DRILL GRINDERS
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1430 E. Maumee St.
Adrian, Michigan

Smart production men don't buy a new piece of equipment just to be "modern." There must be a good reason for a change—a gain in economy, productivity or better workmanship.

OLIVER Die Makers are cutting as much as 60% from die making costs in hundreds of plants where they have replaced expensive, old-fashioned methods of hand sawing and filing. **THESE FIRMS ARE DOING A BETTER, MORE ACCURATE JOB OF DIE MAKING AND GETTING LONGER LIFE FROM THEIR DIES.**

The OLIVER — in several models, to fit your need—does a better job faster, and without requiring a skilled mechanic to operate. Bench model S-4 below at left takes little space; saws, files and laps tool steel up to 1" thick. The 11" table tilts to hold the work at any desired angle. Two speeds. Heavy Duty model at upper left handles stock to 3" thickness, saws up to a 20" circle. Adjustable speed and stroke, constant controlled pressure feed.

Costs still rising? Here's one place where you can beat them down. **WRITE TODAY FOR DIE MAKING CATALOG.**

holding form — holding costs . . .

using Barber-Colman Job-Engineered Cutters.

Have you ever said, "If I can get cutting tools that I can depend on for consistent results and a minimum of hold-ups for reconditioning, I can take care of more production and hold costs in line"?

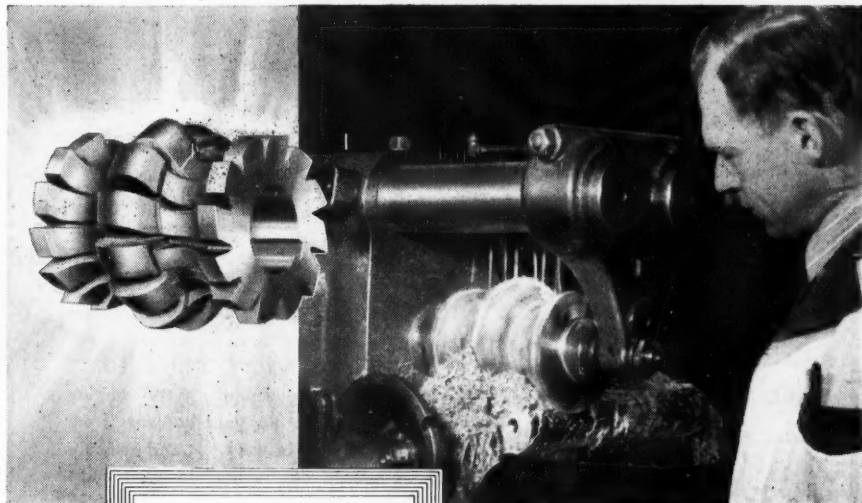
Many cutting tool users want this same dependability. That's why Barber-Colman Milling Cutters are Job-Engineered . . . to eliminate the factors which cause hold-ups on the production line.

For example, this gang of Barber-Colman Formed Cutters was Job-Engineered to maintain exact form limits on all supercharger rotors milled, and produce the desired rate of production with a good record of tool life. Results showed that reliability of the cutters enabled the manufacturer to devote his time and efforts to taking care of machine, material and personnel factors concerning the job.

In order to provide Job-Engineered Cutters, a complete analysis of the proposed job should be made. Ask your Barber-Colman Representative to help you estimate your requirements.

Barber-Colman Company

GENERAL OFFICES AND PLANT 181 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.



JOB FACTS

Operation — Milling Contour of 3 Lobe Rotor 10" long, 1/3 total surface at each indexing. Surface is first roughed, then finished, using same cutter.

Material — Aluminum Alloy

Stock Removed — 3/32" total in two cuts.

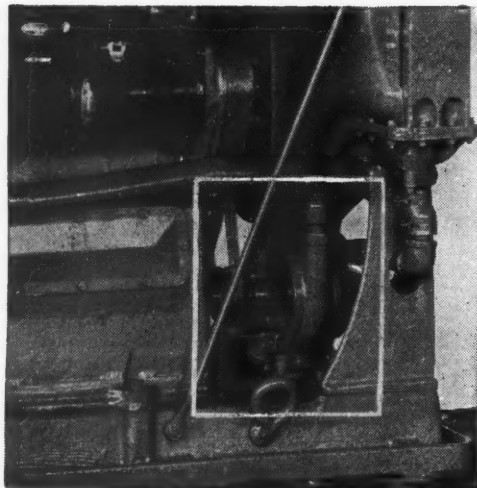
Feed — .005"/rev. Speed — 300 RPM

Floor-to-Floor — 30 min.

Tool Life — 50 complete rotors per sharpening.

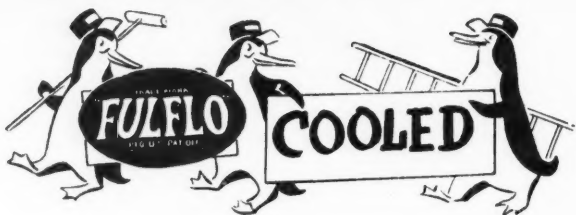
Accuracy — Form matches so that a perfect circle is maintained on each lobe at a radius of 1.160".





Shown in this photo is a Fulflo, circulating the cooling water of the engine made by Universal Motor Co., Oshkosh, Wis.

FULFLO CENTRIFUGAL COOLANT PUMPS



AMERICA'S STANDARD
FOR PERFORMANCE
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Pipe sizes: $\frac{3}{8}$ " to $1\frac{1}{2}$ "

COOGLANTS of the type best fitted for your particular work perform most efficiently ONLY WHEN PROPERLY CONDUCTED . . . that's "A B C". But you simply MUST employ pumps which will bring your coolants from the tank to the tool or work . . . and as thousands of plants can vouch for . . . that's FULFLO CENTRIFUGAL COOLANT PUMPS

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THE

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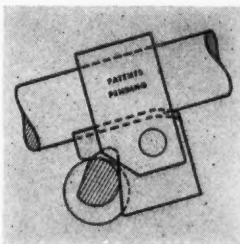


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HARTMANN VISES...

- Lock . . . Hold . . . Unlock speedily and easily. NO LOST TIME . . . NO LOST MOTION
- The LOCK is GUARANTEED . . . It holds tenaciously.

*Available in BENCH and TABLE MODELS.
For specifications write Dept. K-55.*

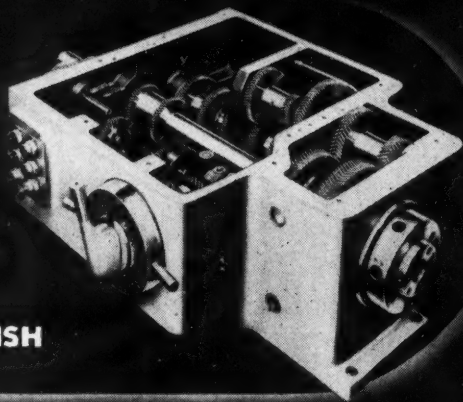


HARTMANN MANUFACTURING CO.

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Export Managers: INDIANAPOLIS MACHINERY EXPORT CO., 44 Whitehall St., New York, N. Y.

*Smooth
Flow of
Power*

**MEANS
SMOOTH
PRECISION FINISH**



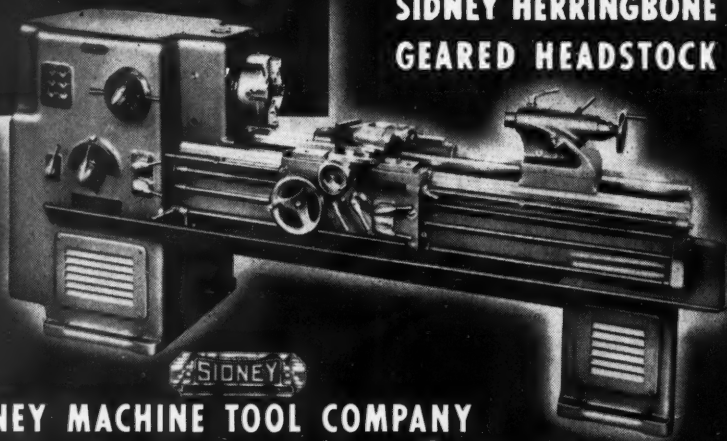
● The Sidney Herringbone geared headstock is not only distinctive in design but based on sound engineering principles and proved by more than 20 years actual operation in Sidney Lathes.

Another feature that makes for accuracy is the three bearing spindle mounting which automatically compensates for expansion due to temperature rise

These are only two of many distinguishing points of design that enable Sidney lathes to produce precision work, faster over longer periods.

Bulletins covering all sizes available.

SIDNEY HERRINGBONE GEARED HEADSTOCK



SIDNEY MACHINE TOOL COMPANY

BUILDERS OF PRECISION MACHINERY SINCE 1904 . . . *Sidney, Ohio*

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for a wide variety of short-run jobs

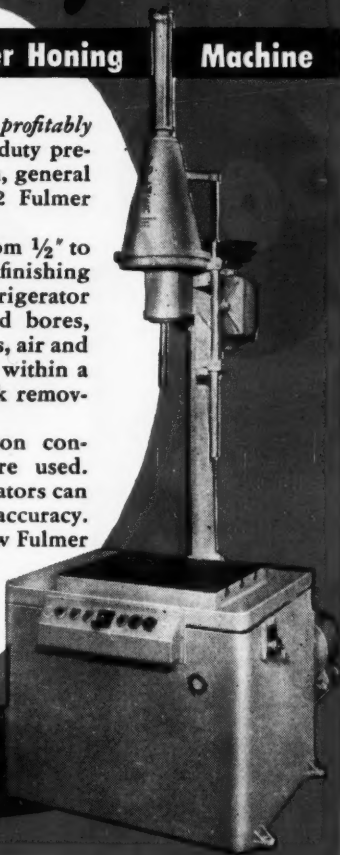
*now practical
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with the new model 412 Fulmer Honing Machine

Now, both large and small shops can *profitably* apply the many advantages of fast, heavy-duty precision honing to a wide range of short-run, general purpose work—with the new Model 412 Fulmer Honing Machine.

Any type of internal cylindrical surface from $\frac{1}{2}$ " to 4" diameter can be honed. Highly accurate finishing of automotive cylinders, sleeves, dies, refrigerator and compressor cylinders, connecting rod bores, bushings, bearing housings and races, valves, air and hydraulic cylinders, etc., can be produced within a fraction of the time required by other stock removing processes.

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FULMER MODEL 412 HONING MACHINE
Single Spindle • $\frac{1}{2}$ " to 4" Honing Capacity
12" Stroke • Full Hydraulic Reciprocation

C. ALLEN FULMER COMPANY

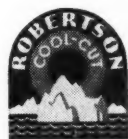
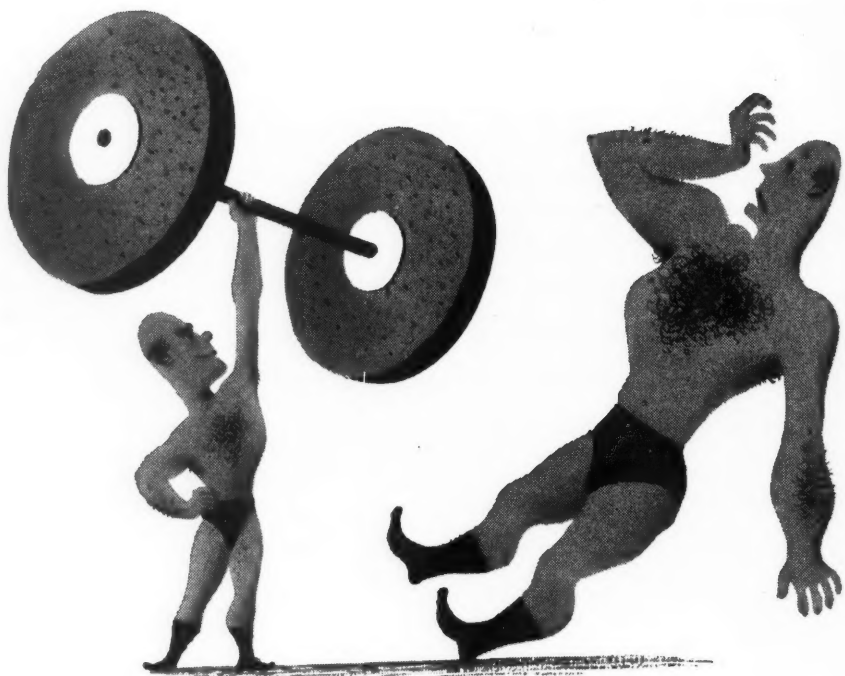
1233 First National Bank Bldg., Cincinnati, Ohio

FULMER

PRECISION PRODUCTION EQUIPMENT

★ Honing Machines • Rod Borers • Piston Ring Lappers

It takes less power
when you use



ROBERTSON WHEELS

Yes, conventional wheels will do the work . . . if you push them to the limit, allow twice as much grinding time, discount wheel wear and omit power consumption in figuring your overhead.

Again and again, Robertson open structure wheels have demonstrated their ability to double and triple production and give you a substantial bonus in decreased power-costs. Here's a good example of that ability:

One large company, operating a Blanchard on half-inch-thick boiler plate thirty inches square and with a ten-inch hole in the center, was taking 45 minutes to remove .050" stock from one side. Ampere reading was 55-67. When the Blanchard was equipped with a Robertson Segmental Wheel, grinding time was cut to 20 minutes (less than half the previous time). Feed was stepped up 25 percent. Ampere reading dropped to 45-50.

Results like these, obtained on difficult boiler-plate grinding operations, indicate the advisability of using Robertson grinding wheels to handle all your grinding work. Blueprint your grinding problems . . . and let us recommend wheels that will solve them.

ROBERTSON MANUFACTURING COMPANY TRENTON 5, NEW JERSEY

Resin-Bonded and Vitrified-Bonded Grinding Wheels • Mounted Wheels • Segments



2160 Holes *Per Hour!*

WITH
SPECIAL

Atlas
DRILL PRESS
SET-UP

If you're looking for a fast way to drill small parts, it will pay to investigate Atlas Drill Presses. Atlas speed, ruggedness, accuracy, and all-round dependability team up efficiently with special fixtures for profitable production drilling.

For example, General Gas Light Co. of Kalamazoo, Mich., uses an Atlas No. 63 Drill Press with automatic feeding device to drill 4 holes in brass valves at the rate of 9 pieces a minute — 2160 holes per hour!

A cam in the feed mechanism, designed by General, drives a rack which operates a pinion connected to the drill press feed spindle. In production, the operator simply positions the work — the Atlas and the automatic feed do all the rest. In another drilling operation, an Atlas with the same type automatic feed drills a $\frac{3}{8}$ " hole, $1\frac{1}{4}$ " deep, in brass at the rate of 660 per hour.

There may be dozens of such profitable uses for Atlas drill presses in your production. Send for a catalog today.



New Catalog
NOW AVAILABLE!

SEND FOR YOUR
FREE COPY TODAY!



ATLAS PRESS CO.
1146 N. PITCHER ST.
KALAMAZOO, MICH.



BOOSTS OUTPUT 67%

THE Rotor Application Engineer was asked by this midwestern fabricating shop to find ways of cutting grinding costs on jobs such as this one—grinding a hand hole with a plug wheel. A check of air pressure showed the *actual working pressure at the tool was only 60 lbs.*, whereas the line pressure was 95 lbs. The half-inch hose was too small and the quarter-inch nipples and hose menders took the punch out of the air flow. The Rotor Application

Engineer recommended replacement with light, flexible $\frac{3}{4}$ " Rotor hose and $\frac{1}{2}$ " nipples. Result:

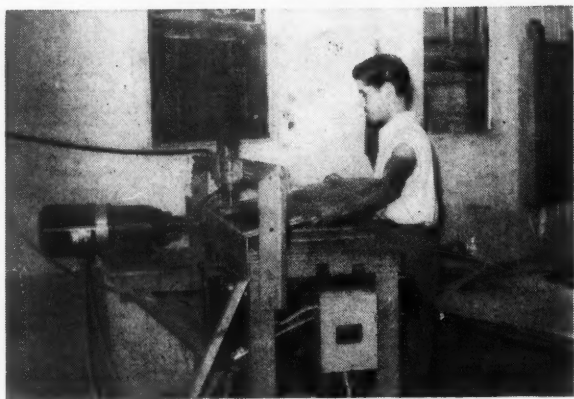
Cut grinding time 40% by increasing working pressure at the tool to 85 lbs.

Call the Rotor Application Engineer for a similar check of your grinding costs. No obligation.



ROTOR TOOL

HIGH
CYCLE



Speeding Up the Drilling of Dowel Holes In Furniture

With a set-up of two Govro-Nelson Automatic Drilling Units, the Weisberg-Baer Company, Long Island City, N. Y., furniture manufacturers, has achieved a new production record in the drilling of dowel holes in table-tops.

Drilling two holes at a time in less than a second, the operator is able to drill 6400 holes in the course of an 8-hour day, including full handling time—double the greatest production previously attained with multiple spindle woodworking machines.

Send for literature showing the possibilities of Govro-Nelson Units from the standpoint of increasing production and reducing labor costs.

WRITE FOR
Literature

GOVRO-NELSON CO.

Machinists of Precision Parts
for 25 Years

1933 Antoinette, Detroit 8, Mich.

Automatic

DRILLING UNIT

*Finer Finishes at Roughing Speeds
to Meet Tomorrow's Competition*



LIPE

*Carbo-
Matic*

LATHES

- **FEWER MAN HOURS** because it is entirely automatic.
- **FEWER MACHINE HOURS** because it is super-powered for speed.
- **FEWER REJECTS** because it is super-rigid for accuracy.

Finer and finer finishes at faster and faster speeds! Speed that is not lost through time lags in loading, unloading and operating—or through high scrap losses and rejects!

Those are competitive factors you'll have to reckon with tomorrow. And worn-out or over-age lathes won't face up to them. They'll cost you more in lost production, spoilage of product and poor workmanship than new Lipe Carbo-Matic Lathes will cost you.

The Lipe Carbo-Matic was designed and built for carbide tools and for tight limits of finish and

accuracy at roughing speeds. Super fast, rigid as a rock, its Cone worm gear and multiple V-belt drive gives a smooth chatterless cut, hogging off metal to rough-grinding tolerances on the first pass. Fully automatic, even on complex cycles, it permits battery operation and reduces loading and unloading time to a minimum. A heavier base, over-size motor, accessible controls and other modern features make it the tool of tomorrow.

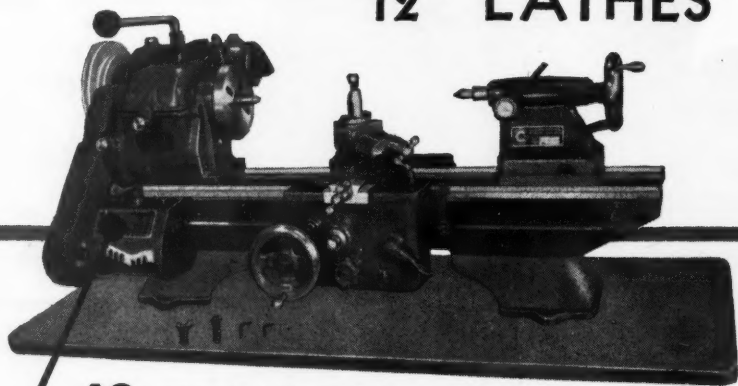
**NOW AVAILABLE
for
IMMEDIATE DELIVERY**



Lipe - **ROLLWAY CORPORATION**
714 Emerson Ave., Syracuse 1, N. Y.

Clausing

DUAL QUICK CHANGE 12" LATHES



48 THREADS AND POWER FEEDS AT YOUR FINGERTIPS

ADDITIONAL

Clausing

FEATURES

- Precision ground bed with two flat and two vee ways
- Adjustable Timken tapered roller bearing headstock
- Ball bearing friction clutch countershaft
- Nine spindle speeds from 33 to 2400 r.p.m.
- Hooded V-belt drive
- Automatic apron

Designed for wide range performance and utmost ease of operation. The Clausing Dual Quick Change 12" Lathe gives instant selection of 48 threads and feeds . . . simply by shifting two levers. Gives finer feeds instantly without stopping lathe. Saves set-up time and operating time on any turning operation requiring power feed. Easy-to-read chart shows lever and gear positions. The Synchronized Gear Box is of "big machine" design and construction. Liberal use of precision ball bearings on which shafts turn readily, with a minimum of friction. Gears are machine cut, $\frac{1}{2}$ " wide for greater strength and longer life. Compare the Clausing Quick Change with lathes in this price range.

For smooth, accurate performance, greater convenience and lasting satisfaction investigate Clausing Lathes today.

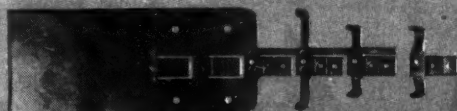
CLAUSING MANUFACTURING CO.

229 RICHMOND AVE.

OTTUMWA, IOWA



Averages
122,500 Pieces per grind



...using **DANLY**
Precision **Die Set**

6-station progressive die setup

speeds production of complex brackets

**save
time**

USE DANLY NATION-WIDE
DIE SET ASSEMBLY SERVICE

Assembly plants (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to your specifications.

- * Chicago 50, 2100 S. 52nd Ave.
- * Cleveland 14, 1550 E. 33rd St.
- * Dayton 2, 990 E. Monument Ave.
- * Detroit 16, 1549 Temple Ave.
- * Grand Rapids, 113 Michigan St., N.W.
- * Long Island City 1, 47-28 37th St.
- * Los Angeles 54, Ducommun Metals & Supply Co., 4890 S. Alameda
- * Milwaukee 2, 111 E. Wisconsin Ave.
- * Philadelphia 44, 18 W. Chelton Ave.
- * Rochester 4, 16 Commercial St.

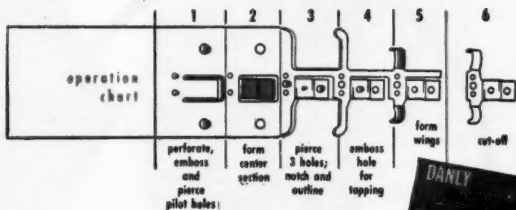
Danly Engineering Service ...

Helpful engineering service will be rendered gladly without obligation. Call on the convenient Danly branch office nearest you. Whether you require close precision or the maintenance of ordinary tolerances, you will find there is a Danly Die Set available to suit your needs in any size, standard or special, for any type of press operation.

The profitable application of progressive dies as a means to speed production and cut stamping costs is illustrated by this die setup. Operating costs are held to a minimum by the maintenance of close punch and die relationship. On a run of over 735 thousand mounting brackets, an average of 122,500 pieces has been obtained per grind. To assure accurate setups and precision operating results, a Danly 4-post precision steel die set is used.

Tolerance of $\pm .003''$ held on hole centers

The bracket is produced from $2\frac{1}{2}''$ by $.042''$ AISI-1008 steel strip at a rate of 7152 pieces per hour. A tolerance of $\pm .003''$ is held between the center lines of the two pierced holes and the one embossed hole. The hole sizes are held to $\pm .005''$.



Write for this free bulletin

Illustrates how you can use Danly's machining service to save additional time and money on special die sets.

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS



25 YEARS OF DEPENDABLE SERVICE
TO THE STAMPING INDUSTRY

PRECISION DIE SETS STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT

PRODUCTION

Accessories *to Lower* **COSTS**



THREAD TOOL

Mounts on any screw cutting lathe and replaces single point thread tools and chasers. Indexing system presents each of ten cutter teeth successively to the work allowing maximum cuts to produce a perfectly formed thread. Duplicates threads without gauging. Write for Bulletin 110.



LOCKJAW

New all purpose work clamp eliminates expensive bolting operations on millers, planers, grinders and drills. Stops work heaving, shimmying, yawing and buckling with sure-grip, locking pressure forward and downward. Write for Bulletin 140.



COLLETS

Lathes, milling machines and other tools can readily be equipped to use Rivett draw-in collets and step chucks. This self-centering, convenient method of chucking reduces time and increases precision on tool-room and production work. Write for Bulletin 100.

RIVETT

RIVETT LATHE & GRINDER, Inc.

BRIGHTON

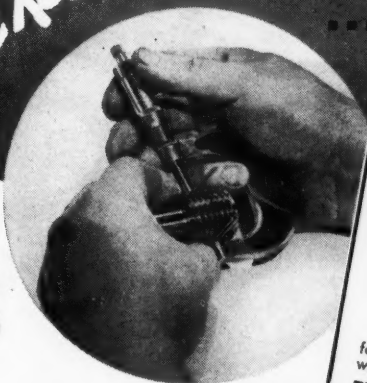
BOSTON

MASS

U.S.A.

Van Keuren

MEASURING WIRES STANDARD EQUIPMENT... ...everywhere



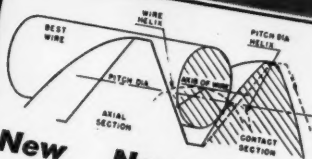
Measuring the pitch diameter of a 1"-8 National Form thread gage. This method is recommended by the Bureau of Standards.

Van Keuren Measuring Wires are the accepted standard equipment for making pitch diameter measurements of taps, thread gages, precision threaded parts, hobs, worms, splines and gears. Reputable manufacturers of ground taps and thread gages used for the protection and acceptance of threaded holes and nuts use Van Keuren Measuring Wires. You will seldom find them in error if you, too, have Van Keuren Measuring Wires.



The VK Catalog and Handbook No. 34 is a 208 page manual, indispensable for engineers, designers, inspectors, tool-makers and machinists. It contains simplified formulas and accurate tables for measuring spur gears, helical gears, splines, serrations and worms. It is the only book which gives the new accurate formulas and tables for measuring the pitch diameter of Screw Threads.

The information on this subject is epoch making in character. It includes a new method for measuring the included angles of screws and a new method of inspecting flat ring surfaces with light waves and a wealth of other hard to find and valuable information. Write today for your copy.



**New New New
NEW CONCEPTIONS
NEW FORMULAS
NEW TABLES**

for the exact measurement of multiple worms and screws of unknown profile.
The Fundamental Fact
The axis of a wire resting in a thread assumes a position tangent to the helix passed through the center of the wire and not the point of contact.



Set No. 20 Thread Measuring Wire is a plant necessity for maintaining taps and thread gages within their limits for wear and for proving the pitch diameter of screws and threaded parts.

Price, High Speed Steel Wires...\$ 95.00
Price, Carbide Wires..... 240.00

Special wires from .002" to 2.000" diameter are made to any tolerance required.

THE Van Keuren

29th YEAR

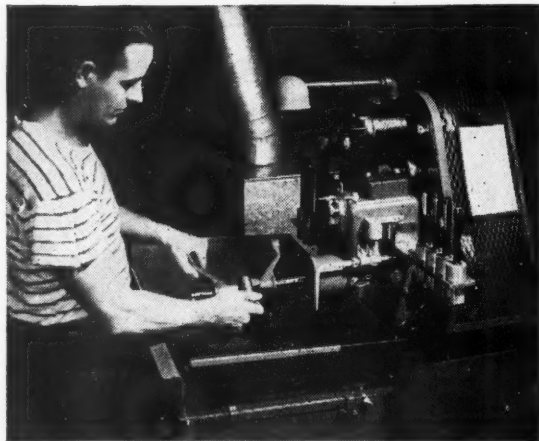
CO.,

175 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Fixtures • Carbide Plug Gages • Carbide Measuring Wires

SUNNEN HONING

Saves Time...



Steps Up Production of Shift Forks...

at Spicer Mfg. Div. of Dana Corp., Toledo, Ohio

Areas on these parts are induction hardened—and the hardening creates high spots and distortion which must be removed.

Surfaces are too hard to ream or to broach, but Spicer engineers found the answer when they turned to Sunnen Honing. Sunnen honing stones removed the metal quickly and at much lower cost than by any other method. Even on parts with slotted diameters, Sunnen Honing produces straight, round holes—with fast rate of stock removal.

Here are other reasons why hundreds of industrial plants are using Sunnen Precision Honing Machines—

- **Wide Range** — hones diameters from .120" to 2.625". Open or blind holes.
- **Hones All Metals, Ceramics, Glass** — steel, cast iron, bronze, brass, aluminum.
- **Accuracy Within .0001"** Guaranteed — correct out-of-roundness and distortion.
- **Produces Any Micro-inch Finish Required** — no high spots or chatter marks.

Write for bulletin XSP-5 or, on request, a Sunnen engineer will be glad to show you the advantages of using Sunnen Honing in your plant.

SUNNEN PRODUCTS COMPANY

7977 Manchester Ave., Saint Louis 17, Mo.
Canadian Factory — Chatham, Ontario

SUNNEN HONING

"Low-cost production of precision holes"



Here lies Joe and
his FAITHFUL AIR GUN
breathed too much dust
now they're both done

***Transparent Bowl Filter would have saved the air gun...**

Use Norgren Transparent Bowl Filters in the feeder air lines to all your pneumatic tools and cylinders . . . Eliminate air-born grit, moisture and oil emulsion. Quickly installed for years of quiet, cost-free service. Intense purification of fouled air takes place thru:

TORNADO JET ACTION—causes moisture separation.

ACTIVE ZONE—where separation takes place *right before your eyes*.

QUIET ZONE—where waste collects for easy draining thru handy waste cock at bottom of full-view bowl.

WRITE FOR COMPLETE INFORMATION



C. A. NORGREN CO.
222 Santa Fe Drive
Denver 9, Colorado

Norgren

SAMPLES...



SEND

Hammond of KALAMAZOO

YOUR SAMPLES FOR A COMPLETE ENGINEERING REPORT

NEW • BETTER • FASTER... Grinding, polishing, buffing, deburring and finishing equipment is being developed continually here at Kalamazoo.

Our new Processing Department is equipped with 35 modern Platen, Contact Wheel, Flexible, Contour (wet or dry) Abrasive Belt Machines — Polishing Lathes — Backstands — Carbide Grinders — OD Cylindrical and Automatic Polishing, Buffing and Deburring machines on which your samples will be processed and returned for comparison.

The applications for this equipment are in the polishing and assembly department — foundry — forging — tool room — machine shop — sheet metal — deburring, etc.

For small production jobs, we have modern hand equipment — for medium production, Semi-Automatics — for high production, Full Automatics.

Send one finished and ten rough samples marked for "Hammond Sample Processing Department." Complete engineering report will be sent promptly—there is no obligation.

Hammond Machinery Co.

.to *Hammond*

of

KALAMAZOO



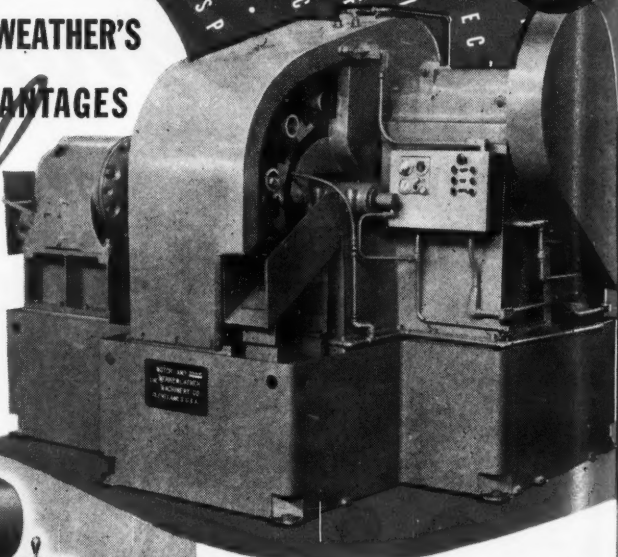
Builders
INC

1615 DOUGLAS AVENUE

KALAMAZOO, MICHIGAN

*Triple-
Chip
METHOD*

You can get
MOTCH & MERRYWEATHER'S
TRIPLE-CHIP ADVANTAGES
in *Special*
**CIRCULAR
SAWING
MACHINES**



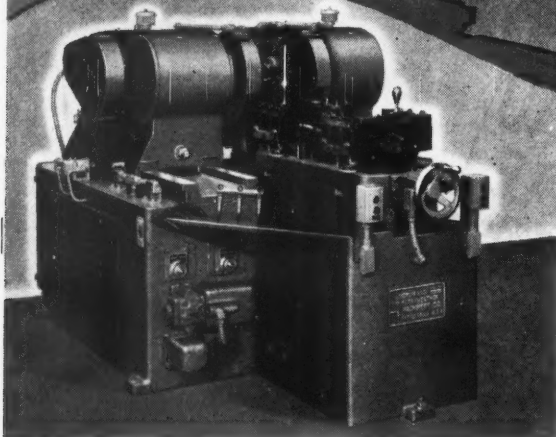
**MOTCH & MERRYWEATHER SPECIAL
PRODUCTION SAW MILLING MACHINE**

Two Triple-Chip Saw Blades mounted in opposite planes automatically saw sprues and risers off cast aluminum bearings. Production is limited only by loading capacity.



**MOTCH & MERRYWEATHER
SPECIAL SAW MILLING MACHINE**

No idle time! Saw-slot two forgings while loading two more. Similar variations can be developed for trimming ends of forging, removing gates and risers from castings, and other operations.



The five basic machines in the M. & M. line of circular sawing machines account for a surprisingly wide range of user needs—but not all of them. We are continually being asked to design adaptations and even new models which will "lick" unusual conditions. Two examples are shown.

Only
M & M builds
ALL 3:
CIRCULAR SAW
SAW BLADE
BLADE GRINDER

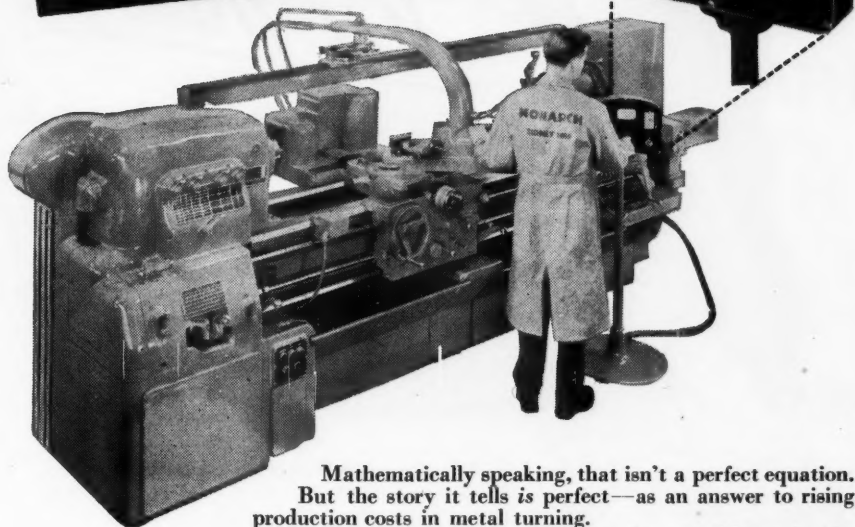
All the features of the Triple-Chip method are preserved. You profit from record-breaking speeds, easy operation, accurate lengths, cuts smooth and square, burrless ends, minimum scrap, and savings in labor, floor space and overhead. Second operations are often cancelled out.

What, sir,
are your requirements?

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING **CLEVELAND 13, OHIO**

3 MINUTES=UP TO 10×>CONVENTIONAL

**with the New Monarch Air-Gage
Tracer Packaged Unit**



Mathematically speaking, that isn't a perfect equation. But the story it tells is perfect—as an answer to rising production costs in metal turning.

What that equation says is that the new Monarch Air-Gage Tracer Packaged Unit, which can change a standard Monarch production lathe from manual to automatic operation in three minutes, will increase production as much as ten times over conventional methods.

This new Packaged Unit, applicable as factory equipment on standard Monarch Engine Lathes, combines the time-saving, cost-cutting advantages of the Air-Gage Tracer with a variable feed and rapid-traverse return, making a completely-automatic cycle lathe. The result is a precision machine that provides maximum production on single pieces or large-lot runs—at a reasonable initial investment cost.

If your production includes multiple-diameter shafts, or the turning, boring or facing of contours, it will pay you to investigate the savings made possible by Air-Gage Tracer Packaged Unit Operation. Get the full facts now. Ask for bulletin 2604.



THE MONARCH MACHINE TOOL COMPANY

SIDNEY, OHIO

FOR A GOOD TURN FASTER · TURN TO MONARCH

HANNIFIN



"hy-power" HYDRAULIC UNITS *for*

RIVETING • PRESSING
PUNCHING • PIERCING

FOR prompt, dependable help in getting tooled up for efficient production, use Hannifin "Hy-Power" Hydraulic Units.

COMPLETE LINE—Portable and stationary types. Standard and special designs available for riveting, pressing, punching, piercing, crimping. Capacities to 100 tons; reach to 6' or more.

FAST—Time cycle for standard riveters ranges from 1½ seconds to 3 seconds for 3" or 4" stroke units.

EFFICIENT—More work with less effort, no noise. Easy to maintain high production rates. Low power costs. Every operating convenience.

PUSH BUTTON CONTROL—A single push button gives you complete control. Hold button down and riveter goes through one complete cycle automatically: rapid advance stroke at low pressure . . . short power stroke at full pressure . . . automatic return to starting position. Hannifin "Hy-Power" units come to you complete with automatic hydraulic pressure generator—READY TO GO TO WORK.

Ask for recommendations.

HANNIFIN

*Nationwide
Sales and
Service*

HANNIFIN CORPORATION

1101 So. Kilbourn Ave., Chicago 24, Ill.

AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

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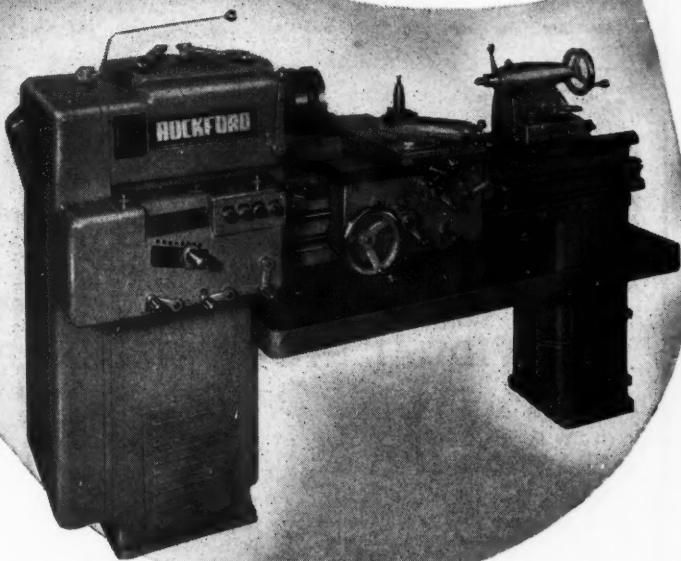
...BACK AGAIN!

Once more the Rockford Machine Tool Co. offers to industry the medium duty lathe that has been a favorite for production, maintenance, and tool room work for two generations.

metalworking's
famous

ROCKFORD Economy LATHE

Re-introduced now, after more than two years of intensive work by skilled machine tool designers... the same men responsible for the world renowned Rockford Hy-Draulic Shapers, Planers, Slotters, and Shaper-Planers.



Completely redesigned from head to tailstock, the Rockford Economy Lathe provides outstanding lathe quality in the medium price field. It has every operating feature and all the precision required for good performance in the tool room or maintenance shop or on the production line. Whether you need a 14" lathe right now... or whether you'll not need one until some time well in the future, may we suggest that you get all the facts to have them on hand for ready reference. Write for Rockford Economy Lathe Bulletin 462.

ROCKFORD MACHINE TOOL CO. • ROCKFORD, ILLINOIS

4814

ALSO MANUFACTURERS OF

SHAPERS

PLANERS

SLOTTERS

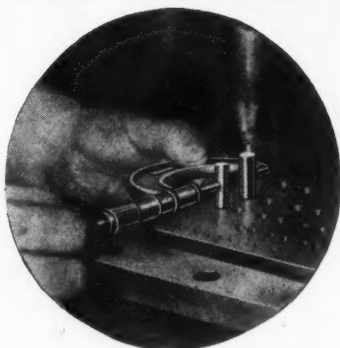
SHAPER-PLANER

Hy-Draulic



YOUR FIRST and WISEST CHOICE

Eliminate fumbling and guessing
when gaging Holes, Slots, Finding
Centers, Locations, Etc.
Horberg Drill Size Pin Gages are
accurate to $\pm .0001$ — $.0000$.



FOR



DEPENDABLE GAGING

• Overall Length $1\frac{1}{2}''$ • Lower Half
Concentric Tapered for Easy Insertion
and Alignment for Holes down to $.0012$
smaller • Oil Hardened Tool Steel.
No other pin gage has such accuracy
at so low a cost.

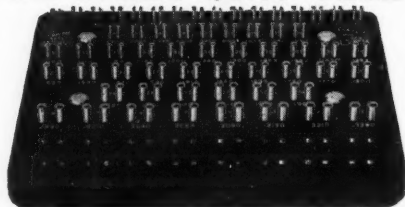
INDIVIDUAL STOCK SIZES \$1.00 each

LETTER SETS: 52 gages
from A to Z—\$45

FRACTION SETS: 60
gages $\frac{3}{64}''$ to $\frac{1}{2}''$ in steps
of $\frac{1}{64}''$ —\$50

NUMBER SETS: 120
gages 1 to 60—\$90

Sets come in pairs for gaging any number of similar holes. All sets
include stands of 3 plates and cover, so that gages stand upright.
Drill size is plainly stamped in front of each hole, together with
decimal equivalent to the ten-thousandth of an inch.

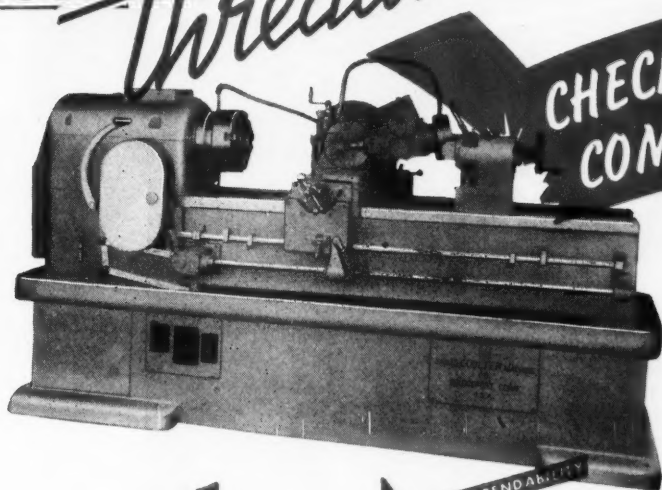


Prices F.O.B. Bridgeport, Conn. Immediate Delivery.

THE *Horberg* GAGE COMPANY

19 STAPLES STREET, BRIDGEPORT 1, CONN.

PRESENTING THE NEW COULTER



* Here at last! The Conventional type Thread Milling Machine that produces long and short precision traversing, elevating cross-feed and lead screws in LESS TIME!

Get the whole story today . . . then CHECK and COMPARE. It's COULTER all the way!



the James
COULTER
Machine Co.

MORE DEPENDABILITY

Anti-Friction Bearings and Spiral and Worm Gears in Cutter Spindle Drive.

MORE EFFICIENCY

Full-size spindle and balance wheel on both ends of cutter spindle drive.

MORE CAPACITY

59 speed changes possible with standard equipment. Cut threads from 1/3 to 20 per inch and diametral leads from 7 to 20 in single, double and triple worms, and leads from .050 to 3.000.

MORE ACCESSIBILITY

All speed and feed changes within easy reach of operator for quick change over.

MORE PRODUCTION

Mill hard and soft materials with carbide tools.

These are reasons enough why you need the Coultter THREADMASTER . . . the Thread Milling Machine of tomorrow . . . threading it better and faster, today!

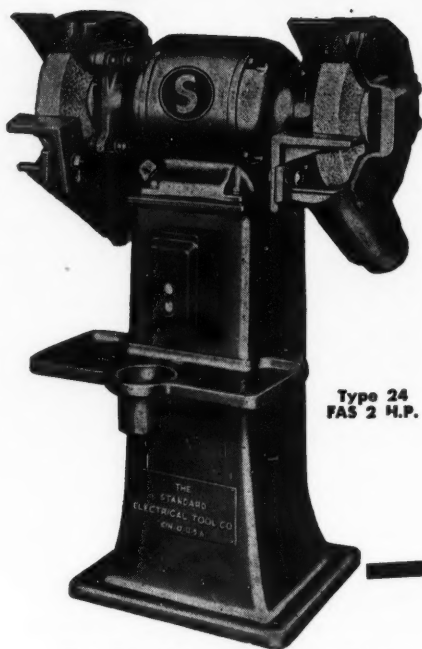
BRIDGEPORT, CONNECTICUT

"CADET" grinders

1 H.P. to 7½ H.P.

**IMMEDIATE
DELIVERY!**

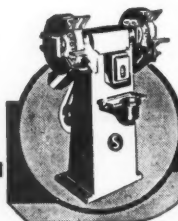
All equipped with Push Button Safety Starter, (Except 10BAP which has toggle switch), tool tray and water pot, adjustable exhaust guards, adjustable spark breaker and work rest.



Type 24
FAS 2 H.P.

Type	H.P.	Grinding Wheels	Price
10 BAP	1	10 x 1¼	\$159.00
24 FAS	2	12 x 2	230.00
36 FAS	3	14 x 2½	267.00
40 FAS	5	14 x 3	330.00
50 FAS	5	18 x 3	460.00
70 FAS	7½	20 x 3	535.00

WRITE TODAY FOR BULLETIN 112



Builders of Standard grinders, and buffing and polishing machines ¼ H.P. to 60 H.P.

The **STANDARD ELECTRICAL TOOL Co.**

CINCINNATI - 4 - OHIO

2487 RIVER ROAD

more

Precision Stampings



A partial view of the many PRESS-RITE Punch Presses used by a prominent mid-western control manufacturer.

Thousands upon thousands of accurate stampings are punched out daily by PRESS-RITE PRESSES. Users know these presses are carefully engineered, ruggedly built, safe and thoroughly dependable. With the safety features on the new 1948 PRESS-RITE PRESSES there is added protection for the operator . . . the dies . . . and the presses. Check the new non-repeat clutch mechanism today! Choose from 5 ton, 10 ton, 12 ton, 18 ton, or 30 ton models according to your requirements.

See your dealer about PRESS-RITE PRESSES today or write us,
Dept. M-118 for details.



With
PRESS-RITE
OPEN BACK, INCLINABLE
PUNCH PRESSES

Sales Service Machine Tool Co.



PRESS
RITE
PRESSES



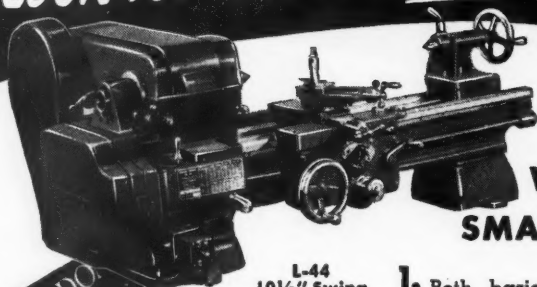
SHAPE
RITE
SHAPERS



KELLER
POWER
HACK SAWS

2363 UNIVERSITY AVENUE
ST. PAUL 4, MINNESOTA

Look for these new Features.

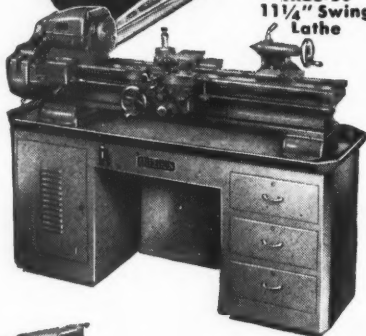


L-44
10 1/8" Swing
Lathe

WHEN BUYING SMALL LATHES



Sheldon
TRBS-56
11 1/4" Swing
Lathe



Sheldon
TU-1248P
13 1/2" Swing
Lathe

1. Both basic (a) and operating (b) accuracy of the bed—(a) Ways held to a tolerance of .0005" for the full length of the bed for parallel alignment. (b) Engineered distribution of mass to give extreme rigidity without excessive bulk.

2. Timken Precision Taper Roller Bearings—for regular operating speed and permanent accuracy.

3. Increased Collet Capacity.

4. Greater Swing for size.

5. Greater Power at tool point.

6. V-Belt Motor Drive with increased speed range.

7. Lower prices—far more tool for the money resulting from modern manufacturing methods, in a specially built plant that is "tooled to the teeth" with the finest machine tool building equipment.

Write for the New G-48 Catalogue of Sheldon Lathes and check each for these 7 important features.

SHELDON MACHINE CO. Inc.

2320 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U.S.A.

DELCO MOTORS

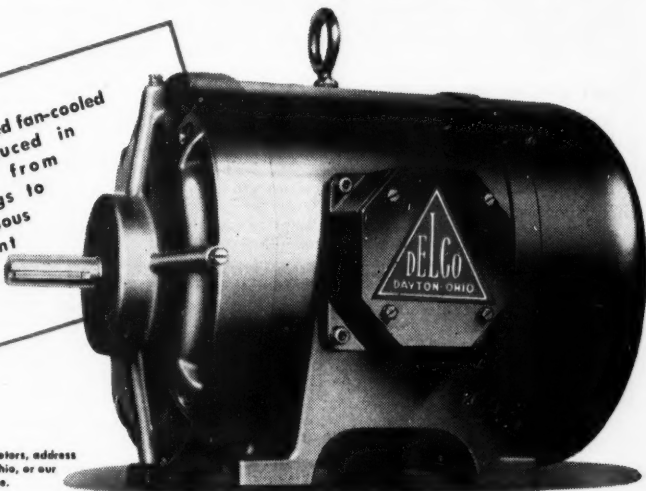
DON'T ASK FOR TIME OUT

To avoid costly down-time . . . to be sure of a smooth flow of power hour after hour, day after day, even under the most unfavorable operating conditions . . . call on Delco for your industrial motor equipment.

You can always count on a reliable Delco motor to carry its load—and you need not count on down-time.

Special features of design account for the outstanding reliability, efficiency, and low maintenance costs of these Delcos. Among these features are locked bearings, Delcote insulation for the coils, corrosive-resistant cast-iron frame, positive lubrication, dynamically balanced rotor and shaft assembly, water-tight four-position conduit box.

Delco totally enclosed fan-cooled motors are produced in sizes ranging from fractional ratings to 75 h.p. (Continuous duty, constant speed, 60 cycle, polyphase.)



For complete data on Delco Motors, address Delco Products, Dayton, Ohio, or our nearest sales office.



DELCO MOTORS
DELCO PRODUCTS, DIVISION OF GENERAL MOTORS CORPORATION

SALES OFFICES: CHICAGO • CINCINNATI • CLEVELAND • DETROIT • HARTFORD

SAVE VALUABLE PRODUCTIVE HOURS

End Excessive Labor in
Work Setups with

DANLY Kwik-Klamps Toggle Clamps

**FOR USE WHEREVER POSITIVE HOLDING
and CONTROLLED PRESSURES ARE REQUIRED**

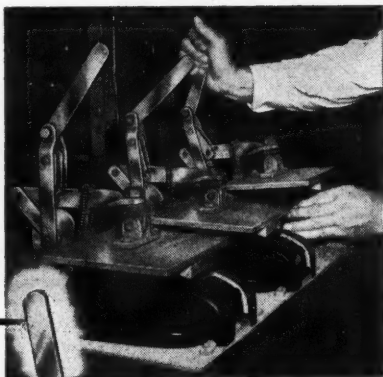
Sharp reduction in work handling is made possible through the use of Danly Kwik-Klamps. Instead of using bolts, screws, c-clamps and other similar means for holding work, these toggle type clamps perform the same function better in a fraction of the time. Valuable productive hours are saved, work holding methods simplified.

Positive Kwik-Klamps toggle arrangement prevents loosening when the clamp is engaged. A simple movement of the handle engages the toggle link to apply holding pressure on the clamp bar. Twenty-six different sizes and styles of Kwik-Klamps have maximum holding capacities ranging, according to size, from 300 to 750 lbs.

WHY KWIK-KLAMPS CUT PRODUCTION COSTS

The universal application of Danly Kwik-Klamps in industry is due to their simple design. Fixed and adjustable flange and straight bases and universal flanged base make them highly adaptable to various holding requirements. With two style handles, horizontal and vertical, the clamps can be used in practically any position.

You can profit by applying these clamps to your holding problems. Complete information will be furnished upon request.



Profitable Kwik-Klamps Uses

- For holding all types of work during fabrication and welding.
- For applying pressure on plastic parts during curing to prevent warpage.
- For holding units and parts during light machining operations.
- For positioning work during inspection and testing.
- For holding parts on assembly and layout tables.
- For countless other similar applications.

PRACTICAL SUPPLIES FOR TOOL, DIE AND GAGE MAKERS



DOWEL PINS
hardened and ground—will not upset in driving—standard or .001" oversize. Tolerances held to .0002" over diameter size.



KNURLED SOCKET HEAD CAP SCREWS
will not slip in fingers—easier to set—wide size range with either fine or coarse threads.



HOLLOW SET SCREWS
three types—standard, self-locking knurled point and self-locking knurled thread—complete size range.



SOCKET HEAD STRIPPER BOLTS
precision made for better fitting—will not shear or strip.



DIE SPRINGS
for complete range of die work—two types—medium pressure... high deflection, and high pressure... medium deflection.



Free Catalog on tool, die and gage-makers' supplies; also Kwik-Klamps wall chart available. Request your copies now. Write to Div. 1184.

25 Years of Dependable Service to the Stamping Industry
DANLY MACHINE SPECIALTIES, INC.

2240 SOUTH 52ND AVENUE, CHICAGO 30, ILLINOIS



MECHANICAL PRESSES • DIE SETS • TOOL, DIE, AND GAGE MAKERS' SUPPLIES

THE DRILL ...
for
Every Job!
THE Mall Drill
REG. U.S. PAT. OFF.

MODEL 381 - CAPACITY $3/8"$

Here is a handy portable electric tool that not only provides a drill for all materials—wood, brick, masonry, steel and plastics—but can also be readily adapted for grinding, sanding, wire brushing, buffing and polishing. When held in a vise and equipped with a grinding wheel, it is excellent for sharpening tools; when fitted into a special stand, it converts into a drill press. Other models available with $1/4"$ to $7/8"$ capacities.

Ask your Supplier or write Power Tool Division for literature.

MALL TOOL COMPANY

7814 South Chicago Avenue

Chicago 19, Illinois

Preferred by Master Craftsmen

Tap Performance is More Than a Tap—

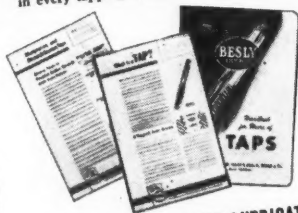
with the

BESLY



"HELPING HAND"
You Get More

WHAT'S YOUR TAP PROBLEM?
Because tap performance is more than a tap you'll find Besly distributors well supplied at all times with information designed to help you achieve top efficiency in every tapping operation.



✓ TAP SHARPENING ✓ TAP LUBRICATION
✓ TAPPING ALUMINUM, MONEL, PLASTICS
and many other tapping operations

Yes, it's the Besly "Helping Hand" that makes a Besly user specify Besly taps again and again. It's more than a tap for it's all this that he gets from Besly—

IT'S FASTER DELIVERY—with Besly's central location and fast handling of high speed specials (24 hours on hardened blank jobs; 3 weeks on bar stock specials).

IT'S TOP TAP QUALITY—delivered consistently on each repeat order.

IT'S BESLY SERVICE—delivery "right now" on standard taps or qualified help to speed the solution of a new or unusual tapping problem.

IT'S COOPERATION—Alert and intelligent, the sort that busy production men need and welcome.

The Besly user gets *all* these plus values because they are all part of the Besly "Helping Hand"—service that you can put to work for you *now* to give your product better threading at lowest possible cost per tapped hole.

Besly's "Helping Hand" Has 5 Strong Fingers

- Fast Delivery
- A Complete Line
- Top Tap Quality
- Engineering Counsel
- Qualified Distributors



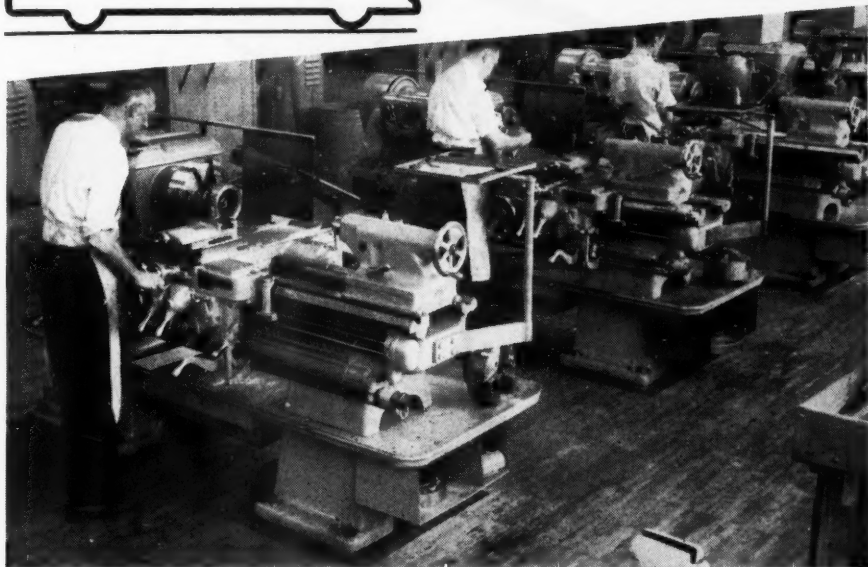
BESLY

BESLY TAPS • BESLY TITAN ABRASIVE WHEELS
BESLY GRINDERS AND ACCESSORIES

CHARLES H. BESLY & COMPANY • 118-124 North Clinton Street • Chicago 6, Illinois
Factory: Beloit, Wisconsin



... For experimental and
new model tooling...



***Noted Auto Manufacturer Finds
ACCURACY BETTER ... TIME SAVED 10% ... OUTPUT UP 15%
... with Lodge & Shipley Lathes**

In the face of rising production costs, machine tools for new car models must be more versatile ... must result in greater economies. One of the nation's largest auto manufacturers finds Lodge & Shipley Lathes are "fine, general purpose lathes" ... "sturdy, accurate and fast ... increase output 15%, save 10% in time, improve accuracy."

In the photo, Lodge & Shipley Lathes are producing transmission brake drums, stator cams and dynamic balancers. Among other parts that are turned, bored, faced and threaded on these lathes are: flywheels, axle shafts, gear blanks, converters, camshaft blanks and balancer parts ... machining alloy steels, cast iron, aluminum, brass and other metals.

A Lodge & Shipley Engineer will gladly prove that various Lodge & Shipley models can do your lathe work to more profitable advantage. Write for condensed Catalog showing the complete line.

* Name on request.

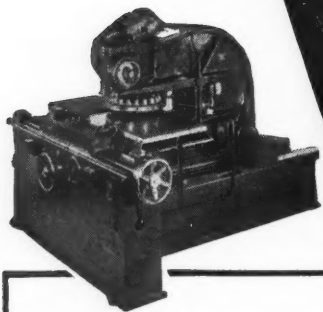
THE **Lodge & Shipley** COMPANY

CINCINNATI 25, OHIO

MACHINE TOOL DIVISION • 3055 COLERAIN

SPECIAL PRODUCTS DIVISION • 800 EVANS ST.

Check your cost on
repairing punches &
dies sheared through
incorrect setups. —



**TEMPLATES ACCURATE TO
±.002" PRODUCED WITH A
WIEDEMANN R-43 IN A
FRACTION OF TIME TAKEN
BY ORDINARY METHODS**

New and revolutionary times have been set on accurate template making with the R-43 Micro Turret Punch Press.

The templates are punched, the hole size accurately maintained, and overall center distances held to ±.002". Two rotating turrets carry the required punches and dies, and thereby eliminate individual set up. A safety mechanism prevents tripping the press until the turrets are locked in alignment. . . shearing of punches and dies is eliminated.

then see a **WIEDEMANN**

A Wiedemann Turret Punch Press handles short run piercing operations at long run high speed and low cost. . . impossible to shear punches and dies. Why? Both upper and lower turrets are synchronized assuring perfect alignment of the punch and die. A positive locking device locks the turrets at the desired station so that the ram cannot be tripped until both turrets are locked into the desired position. There are from 11 to 32 punches and dies carried in the turret always ready for instant piercing.

Send for the complete story of short run piercing economy. . . Bulletin 92. Read how some users report savings up to 2000% in labor alone by using a Wiedemann Turret Punch Press.

WIEDEMANN MACHINE COMPANY
4219 WISSAHICKON AVE. PHILADELPHIA 32, P.A.

Canadian Representative: HOPE MACHINE CO., 21 KING ST., E., TORONTO 1, ONT.
CONFEDERATION BUILDING, MCGILL COLLEGE AVENUE, MONTREAL, QUEBEC



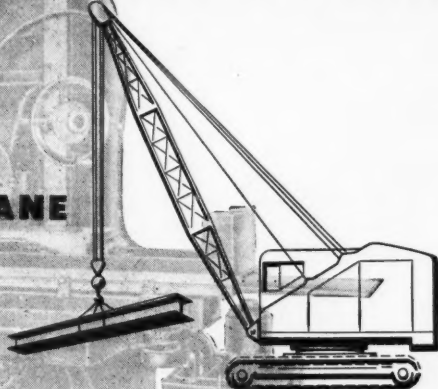
No layout is necessary. Accurate lead screws, with direct reading dials graduated in thousandths of an inch, assure easy positioning and accurate dimensions. The lead screws operate at right angles to each other, are absolutely square with each other.

Dimensioning can be done from the ends of the template or from the center lines. The Micro Turret Punch Press is a method of production whereby all elements necessary to produce accurate templates, inspection piercing templates and many types of flat drill rigs have been combined for maximum efficiency of motion and effort.

A GAUGE



A CRANE



NO SPINDLE PLAY



AND GRAND RAPIDS' MICRO-ACCURACY

GA precision gauge can be only as accurate as the grinding machine used to finish-grind it. The sub-assemblies of a giant crane present an entirely different grinding problem. Whether in removing a few ten thousandths of metal in a high-accuracy operation, or in removing a lot of metal with greater allowable tolerances, freedom from spindle play is extremely important. That's just one of the reasons why you find Grand Rapids Grinders in so many leading plants of all types — from manufacturers of precision gauges to makers of huge cranes.

Other assurances of long-life accuracy and speed are: the fastest longitudinal table speed (125 f.p.m.) available in any grinder; vibrationless rigidity achieved by massive one-piece column and base casting; patented vertical head adjustment; Bijur one-shot lubricating system.

*Accuracy within 0.00025 limits.

To serve you — Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter and Tool Grinders, Hand Feed Surface Grinders, Tap Grinders, Drill Grinders, and Combination Tap and Drill Grinders.

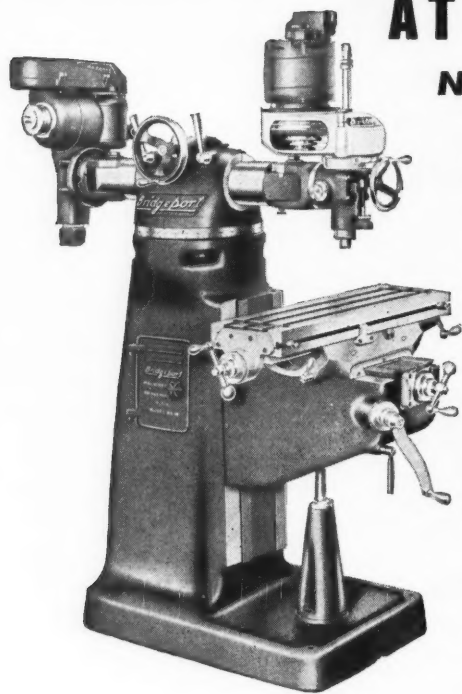


GRAND RAPIDS GRINDERS

308 STRAIGHT AVE., S.W., GRAND RAPIDS 4, MICHIGAN

MILLING, DRILLING AND BORING AT ALL ANGLES

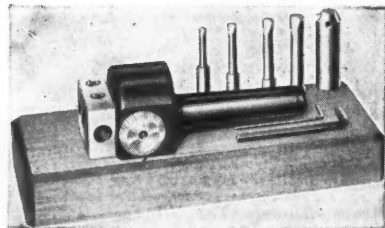
NEARLY 10,000 IN USE



You can use the Bridgeport Turret Milling Machine (with High Speed Attachment) for milling, drilling and boring *at all angles*, with maximum ease and convenience. It's a precision machine for production demands — accurate, sturdy, speedy, powerful.

The wide range and versatility of the Bridgeport Attachment enable it to serve as the complete central machine around which all operations revolve in many small shops. Features include: 15" diameter turret with 5" overarm, rugged construction, table, knee and saddle in convenient front-of-machine position, anti-friction bearings throughout, keyed overarm with worm wheel control for angular settings, large diameter graduated dials. *Write for Bulletin.*

BRIDGEPORT No. 1 BORING HEAD



Specially designed for Bridgeport Machines and Attachments but equally efficient on other machines. Diameter of head, 2 1/4". Adjustment of slide, 3/8". Three holes for 3/8" diameter boring tools giving a range of more than 5". Complete with 5 boring tools and necessary wrenches.

WRITE FOR BULLETIN

BRIDGEPORT MACHINES, INC.

52 REMER STREET

BRIDGEPORT, CONN.

ROUSSELLE Scores Again!

the
NEW 2G
15-TON
ROUSSELLE
PUNCH
PRESS
With the



Deep Throat

ANOTHER OUTSTANDING PRESS ADDED TO THE FAMOUS ROUSSELLE LINE

HIGH PRODUCTION • LOW COST • DEPENDABLE

Ideal for sheet metal and fabricating shops. Punches to center of 36" sheets. Adaptable to trimming plastics, die castings and regular

punch press operations.

Other Presses: 5 - 10 - 15 - 25 ton
O.B.I. 15-25 ton horning with adjustable bed.

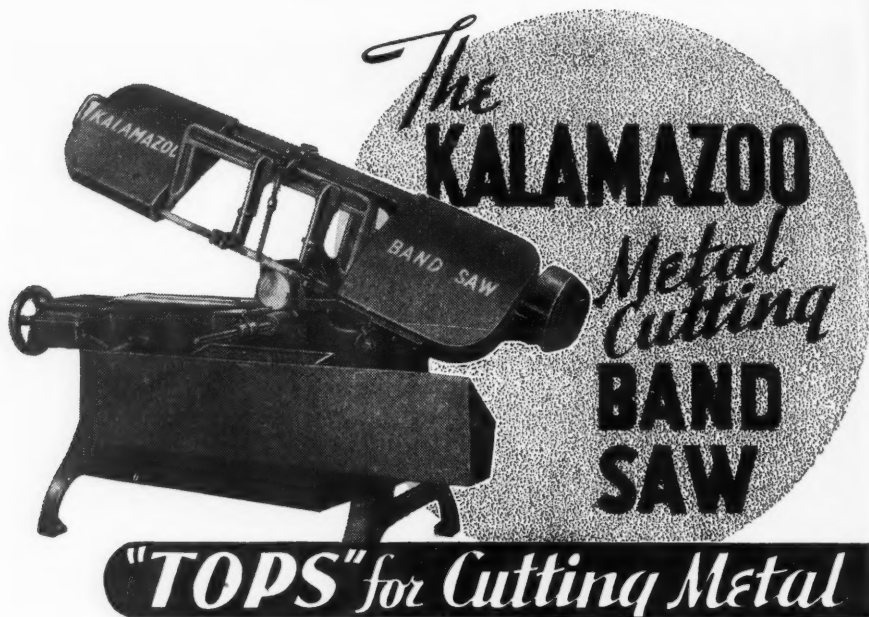
**SEE
YOUR
LOCAL
DEALER**

ROUSSELLE

SERVICE MACHINE CO.

7633 S. ASHLAND AVE., CHICAGO 20, ILL.

**OR
WRITE
DIRECTLY
TO DEPT. AA**



If you want **SPEED, ACCURACY** and **REDUCED PRODUCTION COSTS** in cutting off metals to lengths this low cost tool makes a profitable investment.

Standard Model for intermittent cutting. Coolant Model (illustrated) for continuous production. Automatically cuts anything up to 8 x 10 inches, either solid, angular or tubular. Thousands of satisfied users.

Ask your dealer or ask for bulletin.

MACHINE TOOL DIVISION

Kalamazoo Tank & Silo Company

KALAMAZOO 16

In Canada: Bridge Machinery Co., Montreal

MICHIGAN



**Year after Year
Norma-Hoffmann
Precision Bearings
Serve Efficiently**

Norma-Hoffmann Engineers, specialists for over 35 years in bearing design and application, are available for consultation.

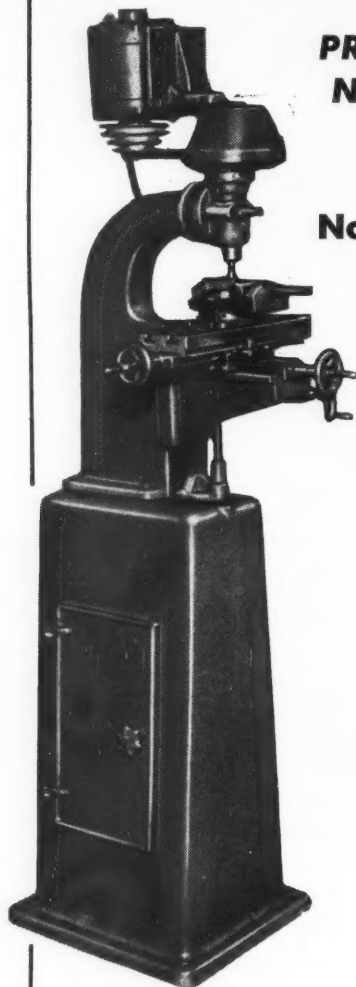


NORMA-HOFFMANN BEARINGS CORPORATION
STAMFORD, CONNECTICUT

FIELD OFFICES: New York, Chicago, Cleveland, Detroit, Pittsburgh Cincinnati, Los Angeles, San Francisco, Dallas, Seattle, Phoenix

November, 1948

MODERN MACHINE SHOP 71



(Patent
Pending)

PRECISION and VERSATILITY
Now at LOW COST—with

COLUMBIA

No. 1 Vertical Milling Machine

with SWIVEL HEAD for
VERTICAL MILLING
ANGULAR MILLING
HORIZONTAL BORING

- Heavy box-type construction.
- Swivel Head graduated 180°.
- 15" x 4" Precision ground Table.
- 1/2" capacity Timken bearing Spindle, hardened and ground.
- Automatic spring release Lock for opening and closing collets.
- Adjustable gibs for table, knee and saddle bearings . . . independent locks for each.
- Easy to read Collars on all feed controls, graduated in .001".

PRICE (less motor) \$352.50

See your local dealer—or write—to

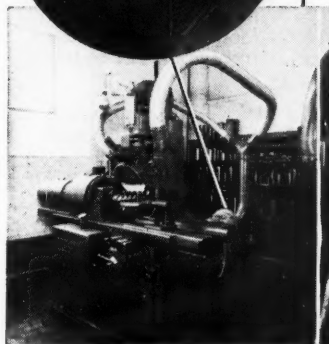
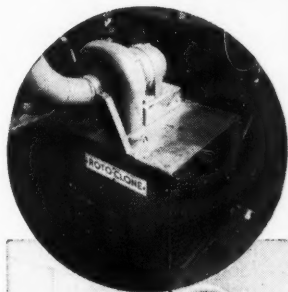
COLUMBIA MACHINE SALES CO.

P. O. BOX No. 8442

CHICAGO 80, ILL.

Hob Grinder gets Roto-Clone treatment

***Roto-Clone Self-Contained Unit brings high efficiency
dust control to isolated operation***



**Roto-Clone is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

ROTO-CLONE* dust control is as flexible as an old shoe. Although in an isolated location, hob grinding on this Barber-Coleman hob machine was converted into a dust-free operation quickly at low cost with the installation of a Roto-Clone Self-Contained Unit.

This compact unit does the complete job in two easy steps. One, it removes the dust from air stream and deposits it in an integral located storage hopper. Two, the air is then passed through a final aftercleaner and recirculated to the workroom. Maintenance consists of regular removal of collected dust from hopper and infrequent cleaning of the viscous filter which serves as the after-cleaner. No long ducts are required and unit may be moved readily to a new location.

Whether your dust control problem involves one machine or scores of them in various locations and groupings, there's a Roto-Clone of a type and capacity that assures you highest collection efficiency at low cost. For complete information on Roto-Clone dust control equipment, see your local AAF representative or write to—

AMERICAN AIR FILTER COMPANY, INC.

100 Central Avenue, Louisville, Ky.

In Canada: Darling Bros., Ltd., Montreal, P. Q.



**ROTO-CLONE
DUST CONTROL EQUIPMENT**

MAKE 1 TAP

DO THE WORK OF 6

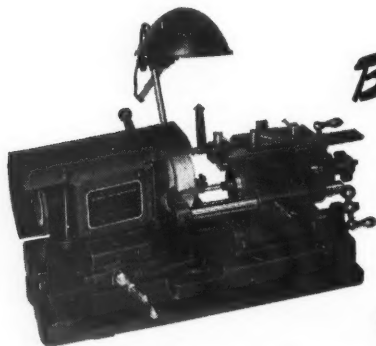
with

Blake

TAP GRINDERS

Users everywhere report increased tap life of 600% and more when Blake Tap Grinders are on the job. (One large user actually reground a single tap 32 times!) Actual tests show that after each grinding both chamfer and relief equal or surpass original tap for accuracy and uniformity. And that's not all — set-ups on Blake Tap Grinders are virtually foolproof, allow little chance for error . . . even unskilled help can grind an average tap accurately in less than one minute.

The answer to economical tapping is the Blake Tap Grinder. Get complete details by sending for free illustrated bulletin — fill out and mail coupon today!



PICK THE MODEL

Best FOR YOUR SHOP!

No. 1 for taps up to 6" long;
No. 2 for taps up to 14". Both
models grind right or left hand
taps with 2, 3, 4, 5, 6, 8 or 10
flutes in sizes from No. 0 to 2½"
Choice of three mounting methods:
on centers, on shank, or on thread.

EDWARD

Blake

COMPANY

Please send me complete details on
The Blake Tap Grinder

NAME _____ TITLE _____

COMPANY _____

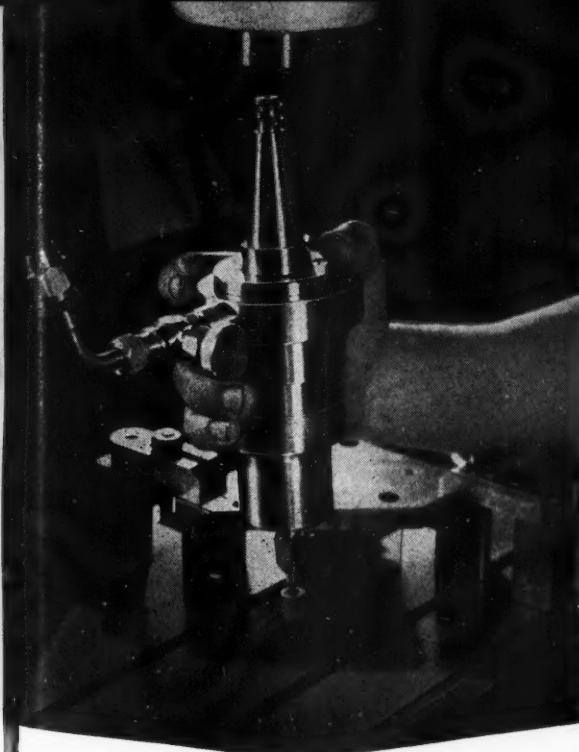
STREET _____

CITY _____ STATE _____

437 Cherry St.

West Newton 65, Mass.

Blake Tap Grinders — Blake Flute Grinder
American Tool Holders — Black Diamond
Precision Drill Grinders — Waltham Cutter
Sharpeners — Waltham Thread Millers
Surface Finish Standards.



Put on—take off—as you
would a boring chuck—
Jig Grind—on your Jig
Borer or Mill.

JIG GRINDING

with the
Vulcanaire

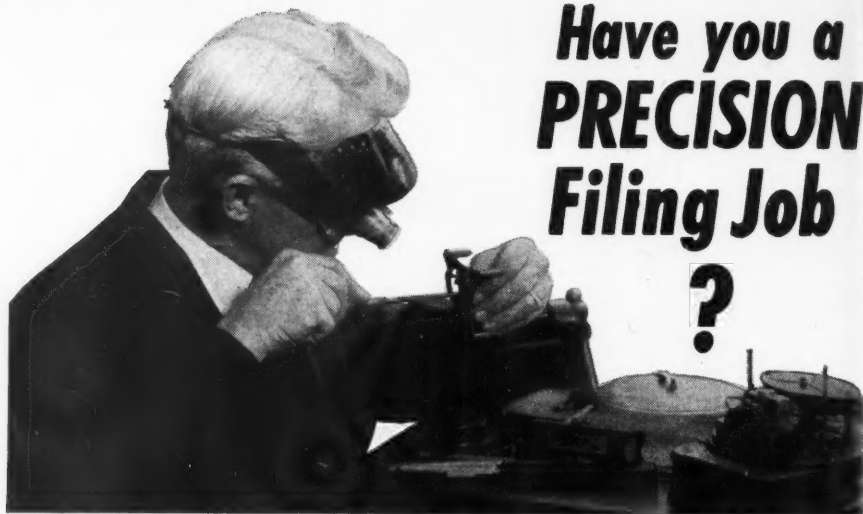
The Vulcanaire System . . .
Includes an adapter to fit the
spindle of your machine tool
Vacuum dust collector
Filter and Oiler
Pressure Gauge
Speed Regulator

When Jig Grinding is needed you can have it
quickly and economically with the VULCANAIRES.
Place it in the spindle of your jig borer (or mill).

AND . . . Locate—Finish Grind holes in hardened
steel to "tenths" at controlled speeds up to 65000 RPM

- . . Grind dowel holes—square with a ground base
- . . Move location of holes in hardened steel blocks
- . . Grind interchangeable holes in hardened sections
- . . Grind .032 to $\frac{1}{8}$ " holes with diamond impregnated
laps
- . . Grind contours and relief with tungsten carbide
burrs
- . . Grind radii in die sections
- . . Grind contours in gages

Write for literature—
for quotation, mentioning
machine tool application.



Use "AMERICAN SWISS" Swiss-Pattern Files

These precision tools are made to an accuracy of $\pm .002$ -in. in many shapes. They come in the fine cuts that enable you to make smooth, well-finished surfaces . . . the small sizes that permit use on delicate parts . . . the wide variety of shapes that fit every surface . . . in other words, exactly the files you need to get best results in least time and for insurance against spoilage on precision filing jobs.

AMERICAN SWISS FILE & TOOL CO.

410 Trumbull Street, Elizabeth 1, N. J.

Buy from our Authorized Distributor.

ASK FOR THEM

BY THIS NAME

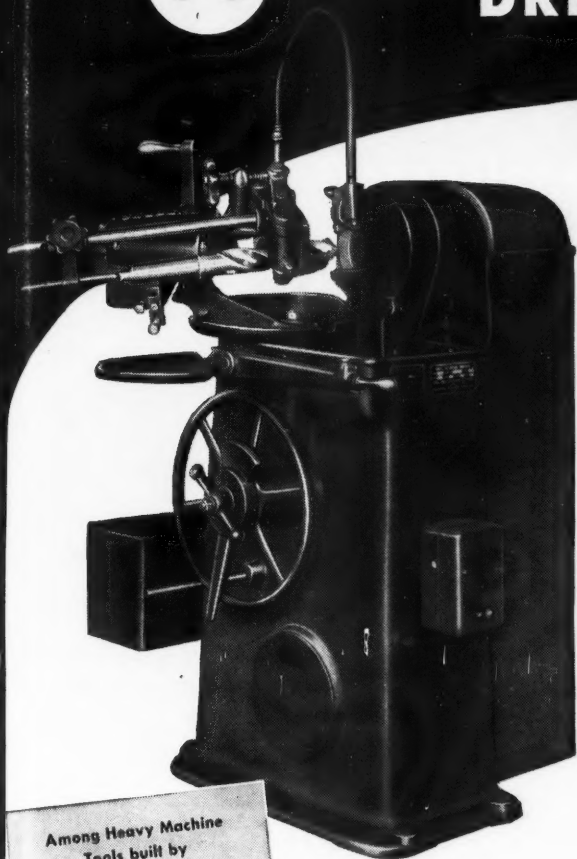
American Swiss



SWISS PATTERN FILES

MODEL
6-G

SELLERS DRILL GRINDER



QUICKLY PAYS FOR ITSELF IN DRILL MAINTENANCE SAVINGS

● INCREASED PRODUCTION

Free cutting accurate drills permit drilling machines to be operated at their most efficient speeds.

● LONGER DRILL LIFE

Less drill material is ground off when re-sharpening drills.

● MORE HOLES PER GRIND

Correctly ground—drills remain sharp for a greater number of holes.

● REDUCED ASSEMBLY COSTS

Eliminates under- and over-size holes. Saves reaming and boring.

● RECLAIMS DAMAGED DRILLS

Sellers grinding method reclaims many burned and broken drills that are ordinarily scrapped.

● ECONOMICAL

This Sellers Grinder has been known to have earned its original cost as many as six times over within a single year.

Among Heavy Machine
Tools built by
Consolidated are . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND
MILLING MACHINES
DRILL AND TOOL
GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

The Sellers 6-G Drill Grinder provides an improved method of grinding that produces correctly formed drill points and duplicate lips. It automatically determines proper clearance according to drill size and grinds drills to equal length for use with multiple spindle drilling machines. This method materially reduces drill maintenance costs. A wet grinder that is especially adapted to grinding high speed twist drills from $\frac{1}{4}$ " to 3" diameter.

Send for complete information

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

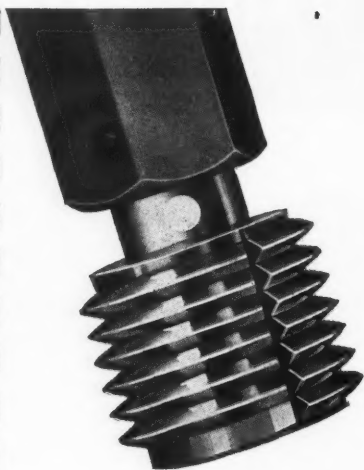
BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS



CONSOLIDATED

MACHINE TOOL CORPORATION

**There IS a
Difference In Gages!**



"Lapping"

Quality gages are lapped to remove grinding marks, as well as the "nap" of a ground surface; imparting a smooth wear-resistant finish.

REPUBLIC gages are lapped by experienced hands, working in a temperature controlled room, to give the ultimate in an accurate long-wearing gage.

REPUBLIC GAGE has the "Know-How" that promises the customer "THAT UNSEEN EXTRA QUALITY".

May we serve you?

RELY ON

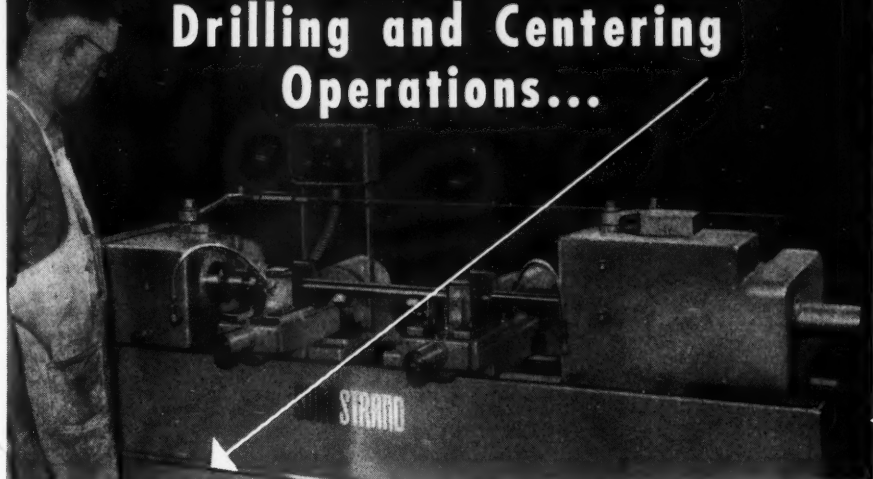


REPUBLIC

REPUBLIC GAGE

DETROIT 21, MICHIGAN

Simplify and **SPEED-UP** Drilling and Centering Operations...



By Using Power Feed and Power Clamping

You'll get fast, accurate drilling or centering on one or both ends of work pieces with the Sundstrand 53A Drilling and Centering Machine. It has four possible spindle speeds which are quickly and easily obtained by interchanging pulleys and vee belts.

The 53A Drilling and Centering Machine is usually furnished with power feed and power operated vises. Hand control for feed and manually operated

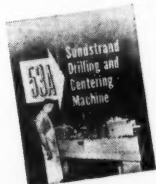
The Sundstrand 53A Drilling and Centering Machine above handles work up to 4" dia. by 24" long. Longer bed machines are also available for maximum lengths of 48 or 72 inch work pieces.

vises can also be furnished or a combination of power feed and hand operated vises or manual feed and power operated vises. When provided with power operated vises, operator can clamp long work near each end from one central push button station.

Hand feed and power operated vises are available at lower cost. Investigate these time-saving machines today.

FREE DATA

This bulletin contains complete specifications and data on this modern Sundstrand Drilling and Centering Machine. Complete specifications for both power and hand feed machines are included. Write for your copy today. Ask for bulletin 578.



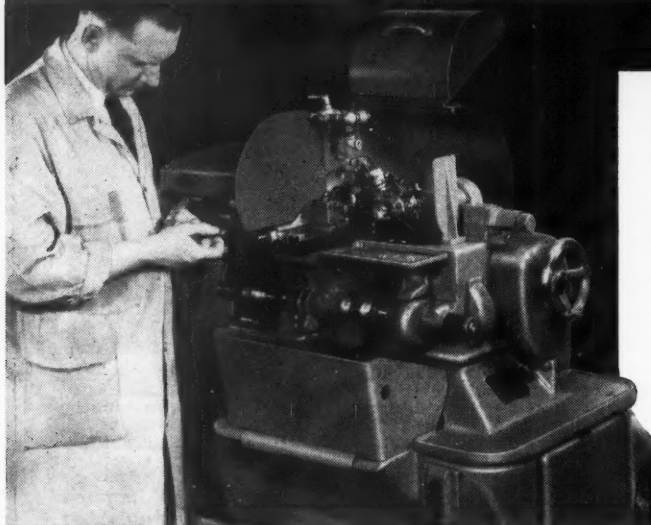
SUNDSTRAND

MACHINE TOOL COMPANY

2539 Eleventh St. • Rockford, Ill., U. S. A.

AUTOMATICS

106 two-speed combinations of spindle speeds . . . positive chain drive to spindle



No. OOG

Takes stock to $\frac{3}{8}$ " diameter.
Turning capacity to $\frac{3}{4}$ ".

$\frac{1}{2}$ " capacity feed tube for light to medium work and turning capacity to $1\frac{1}{4}$ " can be furnished.

No. OG

Takes stock to $\frac{5}{8}$ " diameter.
Turning capacity to $1\frac{1}{4}$ ".

$\frac{3}{4}$ " capacity feed tube for light to medium work and turning capacity to 2" can be furnished.

IMPROVEMENTS AND REFINEMENTS in these Automatic Screw and Automatic Cutting-Off Machines increase their efficiency and permit maintenance of closer limits, finer finish and more uniform production. Wide selec-

tion of speed ratios makes possible the use of correct speeds for threading without limiting selection of efficient high speeds for forming, drilling and similar operations. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

BROWN &

DROWN & SHARPE															
OOG AUTO. SCREW MACHINE SPINDLE SPEEDS															
SPINDLE CLAMP BEARS	RATIO	CHANGES		LOW SPEED		HIGH SPEED		OPPOSITE DIRECTION		LOW SPEED		HIGH SPEED		LAST DIRECTION BEAR	
		UPPER	LOWER	DOWN	UP	DOWN	UP	DOWN	UP						
1-2	20	31	35	39	42	45	48	53	56	60	64	67	70		
3-4	27	34	40	45	50	55	60	65	70	75	80	85	90		
5-6	33	42	48	55	62	68	75	82	90	98	105	112	120		
7-8	39	50	58	68	78	88	98	108	120	132	145	158	170		
9-10	45	58	68	80	92	105	118	132	145	160	180	200	220		
11-12	51	65	78	92	108	125	145	165	185	210	240	270	300		
13-14	57	72	88	105	125	145	170	195	220	250	285	320	360		
15-16	63	80	98	118	140	165	195	225	260	300	340	390	440		
17-18	69	88	108	130	155	185	220	260	300	350	400	460	520		
19-20	75	95	118	142	170	200	240	285	330	380	440	500	570		
21-22	81	102	125	150	180	215	260	310	360	420	480	550	630		
23-24	87	110	135	162	195	235	285	340	400	460	530	610	700		
25-26	93	118	145	175	210	255	310	370	430	500	580	670	770		
27-28	99	125	155	185	225	275	335	400	470	550	640	740	850		
29-30	105	132	165	195	240	295	360	430	510	600	700	810	930		
31-32	111	140	175	210	260	320	390	460	550	650	760	880	1000		
33-34	117	148	185	225	280	345	420	500	600	710	830	960	1080		
35-36	123	155	195	240	305	375	455	540	650	770	900	1030	1170		
37-38	129	162	205	255	325	400	490	580	700	830	970	1110	1260		
39-40	135	170	215	270	345	425	520	620	750	890	1040	1190	1350		
41-42	141	178	225	285	365	450	550	660	800	950	1110	1270	1440		
43-44	147	185	235	300	385	475	580	700	850	1010	1180	1360	1540		
45-46	153	192	245	315	405	500	610	740	900	1070	1250	1440	1630		
47-48	159	200	255	330	420	520	635	770	940	1120	1310	1510	1710		
49-50	165	208	265	345	440	545	665	810	990	1180	1380	1590	1800		
51-52	171	215	275	360	465	575	700	850	1040	1240	1450	1670	1890		
53-54	177	222	285	375	490	605	740	900	1100	1310	1530	1760	2000		
55-56	183	230	295	390	510	630	770	940	1150	1370	1600	1840	2090		
57-58	189	238	305	405	535	660	810	990	1210	1440	1680	1930	2190		
59-60	195	245	315	420	560	690	840	1030	1260	1500	1750	2010	2280		
61-62	201	252	325	435	585	720	880	1080	1320	1570	1830	2100	2380		
63-64	207	260	335	450	610	750	920	1120	1370	1630	1900	2180	2470		
65-66	213	268	345	465	635	785	960	1170	1430	1700	2000	2280	2580		
67-68	219	275	355	480	660	815	1000	1220	1500	1780	2080	2380	2690		
69-70	225	282	365	500	685	845	1040	1270	1560	1860	2170	2480	2800		
71-72	231	290	375	515	710	870	1080	1320	1620	1930	2250	2570	2900		
73-74	237	298	385	530	735	900	1120	1370	1680	2000	2330	2660	3000		
75-76	243	305	395	545	760	935	1160	1420	1740	2080	2420	2760	3100		
77-78	249	312	405	560	785	970	1200	1470	1800	2150	2500	2850	3200		
79-80	255	320	415	575	810	1000	1240	1520	1860	2220	2580	2940	3300		
81-82	261	328	425	590	835	1035	1280	1570	1920	2300	2670	3040	3400		
83-84	267	335	435	605	860	1070	1320	1620	2000	2400	2780	3160	3540		
85-86	273	342	445	620	885	1105	1370	1670	2060	2460	2850	3240	3620		
87-88	279	350	455	635	910	1140	1420	1720	2120	2530	2930	3330	3720		
89-90	285	358	465	650	935	1175	1470	1770	2180	2600	3010	3410	3800		
91-92	291	365	475	665	960	1210	1520	1820	2240	2670	3080	3480	3880		
93-94	297	372	485	680	985	1245	1570	1870	2300	2750	3160	3560	3960		
95-96	303	380	495	695	1010	1280	1620	1920	2360	2820	3240	3640	4040		
97-98	309	388	505	710	1035	1315	1670	1970	2420	2890	3310	3710	4100		
99-100	315	395	515	725	1060	1350	1720	2020	2480	2960	3380	3780	4180		
101-102	321	402	525	740	1085	1385	1770	2070	2540	3030	3450	3850	4250		
103-104	327	410	535	755	1110	1420	1820	2120	2600	3100	3520	3920	4300		
105-106	333	418	545	770	1135	1455	1870	2170	2660	3170	3590	3990	4380		
107-108	339	425	555	785	1160	1490	1920	2220	2720	3240	3660	4060	4450		
109-110	345	432	565	800	1185	1525	1970	2270	2780	3310	3730	4130	4500		
111-112	351	440	575	815	1210	1560	2020	2320	2840	3380	3800	4200	4580		
113-114	357	448	585	830	1235	1595	2070	2370	2900	3450	3870	4280	4660		
115-116	363	455	595	845	1260	1630	2120	2420	2960	3520	3940	4360	4740		
117-118	369	462	605	860	1285	1665	2170	2470	3020	3590	4010	4410	4800		
119-120	375	470	615	875	1310	1700	2220	2520	3080	3660	4080	4480	4880		
121-122	381	478	625	890	1335	1735	2270	2570	3140	3730	4150	4560	4960		
123-124	387	485	635	905	1360	1770	2320	2620	3200	3800	4220	4640	5040		
125-126	393	492	645	920	1385	1805	2370	2670	3260	3870	4290	4710	5100		
127-128	399	500	655	935	1410	1840	2420	2720	3320	3940	4360	4780	5180		
129-130	405	508	665	950	1435	1875	2470	2770	3380	4010	4430	4850	5250		
131-132	411	515	675	965	1460	1910	2520	2820	3440	4080	4500	4920	5320		
133-134	417	522	685	980	1485	1945	2570	2870	3500	4150	4570	4990	5390		
135-136	423	530	695	995	1510	1980	2620	2920	3560	4220	4640	5060	5460		
137-138	429	538	705	1010	1535	2015	2670	2970	3620	4290	4710	5130	5530		
139-140	435	545	715	1025	1560	2050	2720	3020	3680	4360	4780	5200	5600		
141-142	441	552	725	1040	1585	2085	2770	3070	3740	4430	4850	5280	5680		
143-144	447	560	735	1055	1610	2120	2820	3120	3800	4500	4920	5350	5750		
145-146	453	568	745	1070	1635	2155	2870	3170	3860	4570	4990	5420	5820		
147-148	459	575	755	1085	1660	2190	2920	3220	3920	4640	5060	5490	5890		
149-150	465	582	765	1100	1685	2225	2970	3270	3980	4710	5130	5560	5960		
151-152	471	590	775	1115	1710	2260	3020	3320	4040	4780	5200	5630	6030		
153-154	477	598	785	1130	1735	2295	3070	3370	4100	4850	5270	5700	6100		
155-156	483	605	795	1145	1760	2330	3120	3420	4160	4920	5340	5770	6170		
157-158	489	612	805	1160	1785	2365	3170	3470	4220	5000	5410	5840	6240		
159-160	495	620	815	1175	1810	2400	3220	3520	4280	5070	5480	5910	6310		
161-162	501	628	825	1190	1835	2435	3270	3570	4340	5140	5550	5980	6380		
163-164	507	635	835	1205	1860	2470	3320	3620	4400	5210	5620	6050	6450		
165-166	513	642	845	1220	1885	2505	3370	3670	4460	5280	5690	6120	6520		
167-168	519	650	855	1235	1910	2540	3420	3720	4520	5350	5760	6190	6590		
169-170	525	658	865	1250	1935	2575	3470	3770	4580	5420	5830	6260	6660		
171-172	531	665	875	1265	1960	2610	3520	3820	4640	5490	5900	6330	6730		
173-174	537	672	885	1280	1985	2645	3570	3870	4700	5560	5970	6400	6800		
175-176	543	680	895	1295	2010	2680	3620	3920	4760	5630	6040	6470	6870		
177-178	549	688	905	1310	2035	2715	3670	3970	4820	5700	6110	6540	6940		
179-180	555	695	915	1325	2060	2750	3720	4020	4880	5770	6180	6610	7010		
181-182	561	702	925	1340	2085	2785	3770	4070	4940	5840	6250	6680	7080		
183-184	567	710	935	1355	2110	2820	3820	4120	5000	5910	6320	6750	7150		
185-186	573	718	945	1370	2135	2855	3870	4170	5060	5980	6390	6820	7220		
187-188	579	725	955	1385	2160	2890	3920	4220	5120	6050	6460	6890	7290		
189-190	585	732	965</												

FOR YOUR
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Be Sure
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Buhr

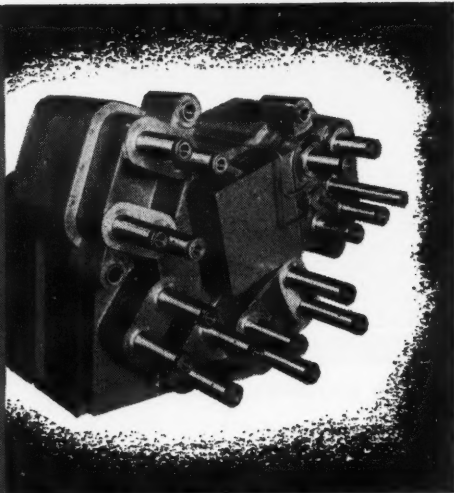
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For your vital retooling, call on BUHR—the Company with the longest and widest experience in Producing Multiple Spindle Drilling and Tapping Heads—

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Send your problem and blueprints to us. We'll give you our recommendations—and at no cost.



Buhr 16-Spindle 5-Station Drill Head made for the production of Steering Knuckle Supports.

Station No. 1—Load and unload.

Station No. 2—Two $1\frac{3}{16}$ " drills and two $1\frac{1}{16}$ " drills for spot drilling.

Station No. 3—Two $1\frac{3}{16}$ " drills and two $2\frac{7}{16}$ " drills for boring half-way through.

Station No. 4—Two $1\frac{1}{16}$ " drills and two $3\frac{3}{16}$ " drills for boring through.

Station No. 5—Two 1.109 reams and two .875 reams, both accelerated.

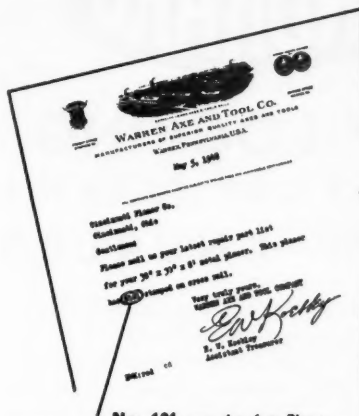
This drill head was made for mounting on a No. 40 Defiance Drill Press as a part of the customer's retooling program.

Consider the possibility of using your present Drill Presses in this way in your retooling program. Call on us for information.

BUHR MACHINE TOOL COMPANY

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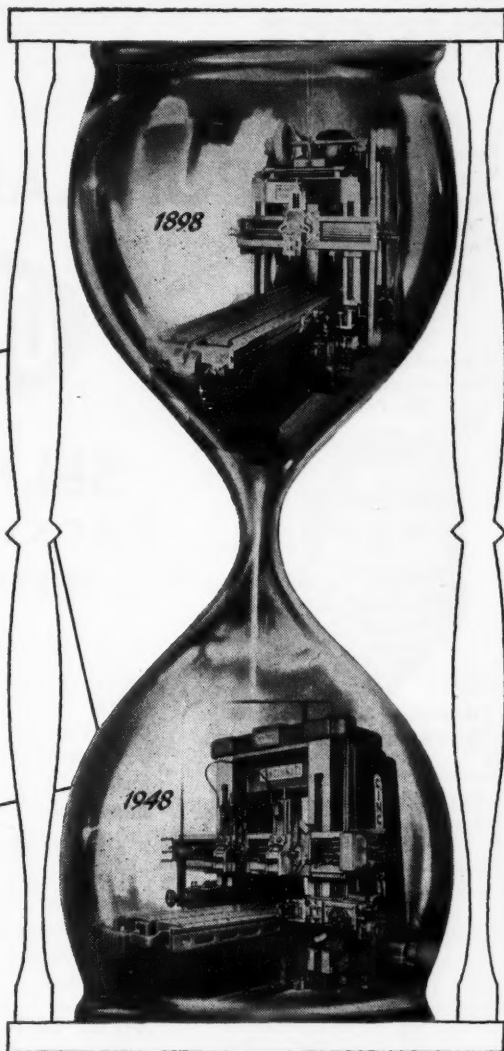
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No. 101 was the first Planer manufactured by the Cincinnati Planer Company. They made a good Planer in 1898 of highest quality and finest workmanship which has stood the test of time.

Today we make an even better Planer. The modern Cincinnati HYPRO Planer, still retaining all of the Hypro-duction features and craftsmanship developed through years of experience, has been improved to incorporate new and exclusive features such as centralized finger-tip control for the complete operation of the machine, all steel hardened "twin" helical gear train, double nuts on both saddle and down slide screws, inverted dovetail slides, double acting tool block abutment, centralized dual saddle control and precision adjustment handles. These features provide increased production, lower planing costs and convenience to the operator.

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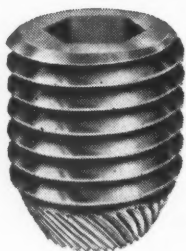
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THEY'RE THE POPULAR



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"Unbrako" Socket Set
Screw with Knurled
Cup Point.



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"Unbrako" Socket Set
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Knurling of Socket
Screws originated with
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You can't tighten
or loosen socket
screws without a
hex socket wrench,
so why not get our
No. 25 or No. 50
"Hallowell" Hol-
low Handle Key
Kit which contains
most all hex
socket bits.

KITS: PATS. PEND.

UNBRAKO

Reg. U. S. Pat. Off.

SELF-LOCKING SOCKET SET SCREWS ...THEY'RE KNURLED

The KNURLED cup point of this popular "Unbrako" Socket Set Screw—upper left—makes it a *Self-Locker* . . . because the keen edges of the counter-clock-wise KNURLS definitely prevent creep, regardless of the most chattering vibration. A real fastener, if ever there was one . . . positively won't shake loose!

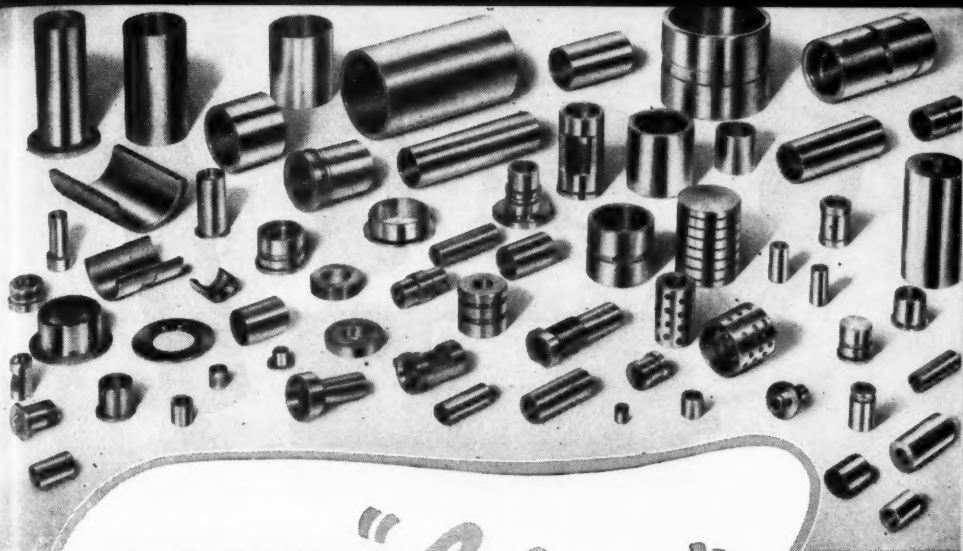
The KNURLING of this patented "Unbrako" Socket Set screw—lower left—as shown,—*swages* the threads, so that it becomes a most excellent *Self-Locker* . . . for use where the type of point does not lend itself to knurling—a Set Screw that positively won't shake loose!

**Write us for the name and address of
your nearest "Unbrako" Industrial Dis-
tributor and your copy of the "Unbrako"
Catalog.**

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*...The Exceptional Quality High Lead Bearings
That Pay Users Back Over and Over Again*

Buckeye "Lubrico" Bearings combine reduced coefficient of friction, excellent conformity to overcome slight shaft misalignments, the ability to withstand heavy shocks without cracking, and extremely desirable qualities of self-lubrication.

They minimize the chances of freeze-ups and breakdowns,—yet cost little more than bearings of standard analysis.

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Your wrenches are always handy when they're in sets. $\frac{3}{8}$ " - $\frac{1}{2}$ " - $\frac{3}{4}$ " Square drive Sockets, ratchets, extensions, speeders, flex handles in rugged steel boxes. Literature gladly sent.



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Accurate and PLENTY FAST!

The Ideal Surface Grinder

for Toolrooms . . .

ABRASIVE No. 1 1/2 is a stickler for accuracy and a glutton for work — it handles all jobs that come to your toolroom and handles them fast! Motorized spindle delivers full power directly at the grinding wheel . . . eliminates all belting. No. 1 1/2 takes heavy cuts without vibration and produces fine, accurate finishes.

For years of economical and productive grinding service, you can rely on ABRASIVE design and precision workmanship.

Ask for descriptive bulletin.

SPECIFICATIONS

WORK CAPACITY — 15" long, 10" wide, 12" high

GRINDING WHEEL — Standard 12" diameter

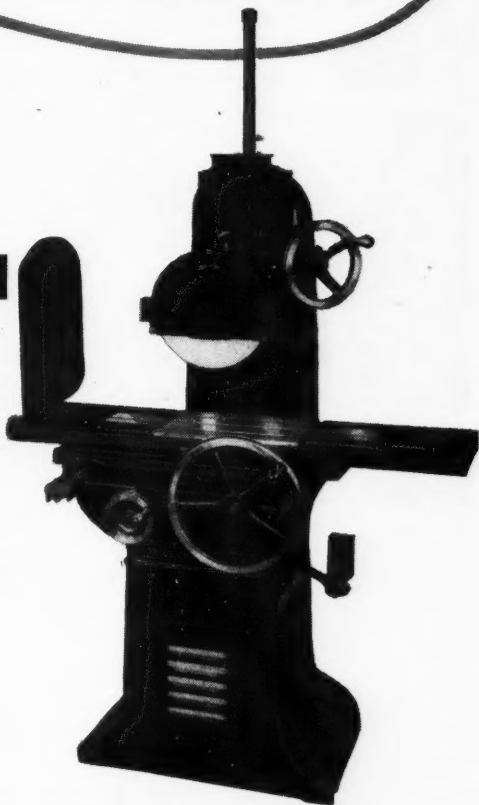
DRIVE — 1 H.P. motor mounted on spindle

TABLE SIZE OVERALL — 48" x 11 1/4"

FEEDS — All hand feeds; Transverse graduated .001"; Vertical .00025". Metric graduations if specified.

NET WEIGHT — 1350 lbs.

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, RHODE ISLAND



ABRASIVE

ACCURACY BOOSTS PRODUCTION

Talk about versatility!

Here's Real Proof of the Job Adaptability You Get in This 8-Ton

MULTIPRESS *

You get a real workhorse with "micrometer accuracy" in this bench-size, 8-ton MULTIPRESS. It has rugged strength for heavy-duty jobs . . . precision control

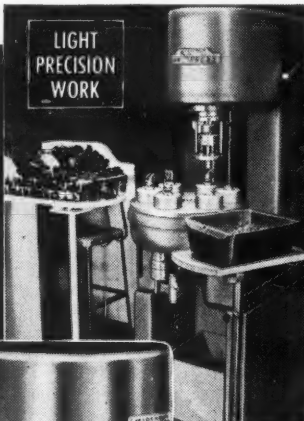
for light high-speed work . . . quick-tooling ease for switching from one job to another. You see this adaptability at work in the photos below.



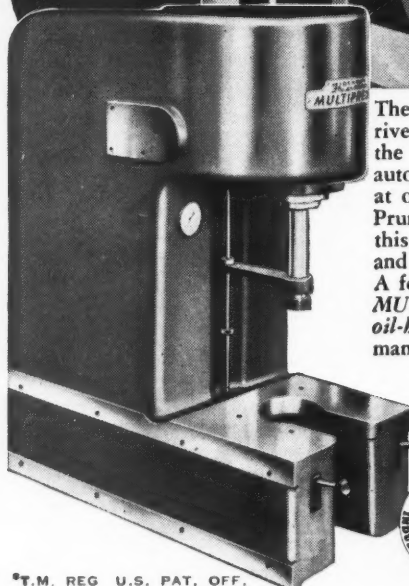
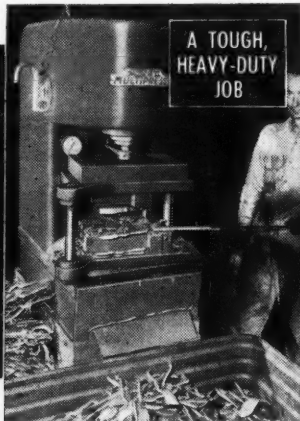
SPECIFICATIONS

8-Ton Multipress	
Capacity (tons)	8
Stroke	12"
Daylight	18"
Throat Depth	8 1/4"
Approach Speed	
(Maximum)	500 ipm
Pressing Speed	200 ipm
Return Speed	300 ipm

LIGHT PRECISION WORK



A TOUGH, HEAVY-DUTY JOB



The 8-ton MULTIPRESS in the photo at left rivets assemblies of ball-bearing caster parts at the Colson Corporation, Elyria, Ohio. Featuring automatic control, it keeps *two* operators busy at one time.

Pruning-shear forgings are trimmed rapidly by this 8-ton MULTIPRESS at The American Fork and Hoe Company, Charleston, W. Va. (right). A foot-pedal controls the ram.

MULTIPRESS is a high-speed, high precision oil-hydraulic tool — offering a wide choice of manual and automatic controls, accessories, and attachments for an amazing range of jobs. 4, 6, 8, and 25-ton capacities — *plus the new one-ton Midget!* Write for details!

The DENISON Engineering Company
1153 Dublin Road, Columbus 16, Ohio



*T.M. REG U.S. PAT. OFF.

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NO OTHER CHOICE

True, King John had no other choice when he signed the Magna Carta . . . but purchasing agents and toolroom men today are offered the widest choice obtainable when they select Bay State grinding wheels.

BAY STATE FRACTIONAL GRADES
split every single normal grade into 3 degrees of hardness. Yes, this exclusive Bay State development enables you to make a more precise selection to get the best possible grinding wheel for any particular job.

If you aren't getting top performance from your present grinding wheels, it will pay you handsomely to investigate the possibilities of Bay State Fractional Grades.

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175
HYDRAULIC



Modern Marking Machines now enable most manufacturers of metal components to identify their products at trifling cost.

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MANUFACTURERS—
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PERMANENTLY ROLLED
ON YOUR PRODUCTS
WILL HELP YOU MARKET
THEM.**

Send prints of parts, showing required marking and its location on part with hourly production for free recommendation.

*Illustrated at the left is
Model 175 Hydraulic
Marking Machine.*

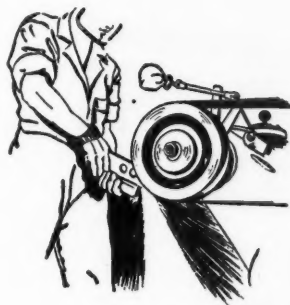
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Why the new RESINALL METALITE® BELT cuts faster, longer

It beats the heat of heavy stock reduction, because of its heat-defying thermosetting resin bond, plus Behr-Manning Durabonding. Every abrasive grain is double-locked rigidly in place, cutting edge up, and held there.

You get higher production because of sustained sharp cutting, new immunity to loading, less time out for belt changes, and 2 to 4 times the belt mileage. Check all this in your own shop—mail the coupon.

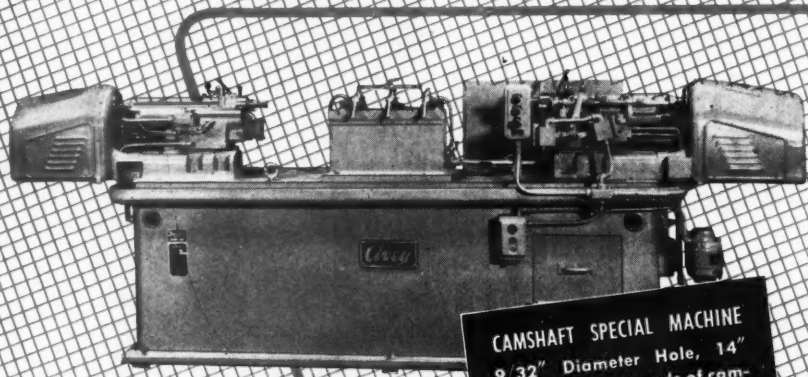
BEHR-MANNING • TROY, N. Y.

(Division of Norton Company)

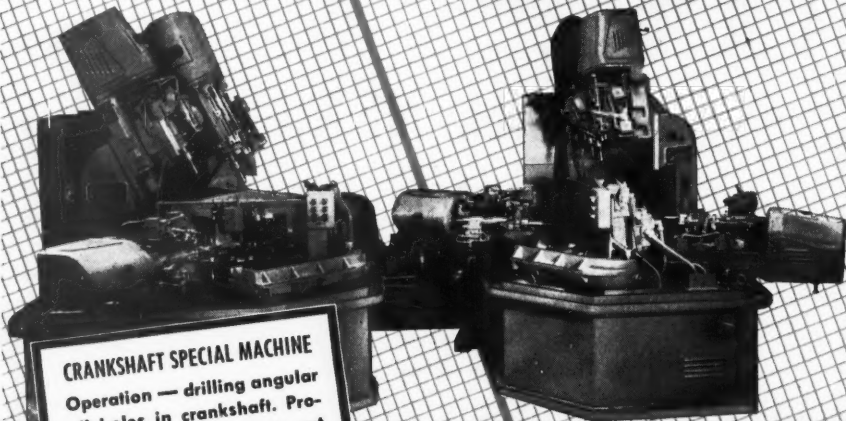
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METALITE belt can do
on our work.

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CAMSHAFT SPECIAL MACHINE
9/32" Diameter Hole, 14"
deep. Drills both ends of cam-
shaft. At least 100% saving
over previous method!



CRANKSHAFT SPECIAL MACHINE
Operation — drilling angular
oil holes in crankshaft. Pro-
duction increased, costs cut
the TORQUE-MATIC way.

**YOUR DRILLING AND TAPPING PROBLEMS
GET IMMEDIATE ATTENTION FROM AVEY'S
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NOW-a Drilling Machine that gives you . . .

- Automatic Withdrawal for Chip Removal only when necessary during Deep Hole Drilling! *
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- Mechanically and Electrically Controlled Spindle!
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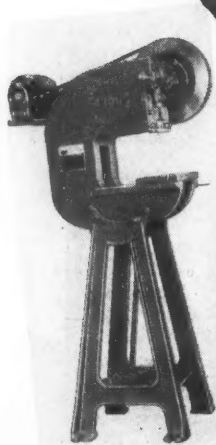
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3/8	11/16	4	5/16	7	4.25
13/32	11/16	4	5/16	7	4.75
7/16	11/16	4	3/8	7	4.75
15/32	1	4	3/8	7	5.00
1/2	1	6	7/16	8	5.50
17/32	1	6	7/16	8	5.75
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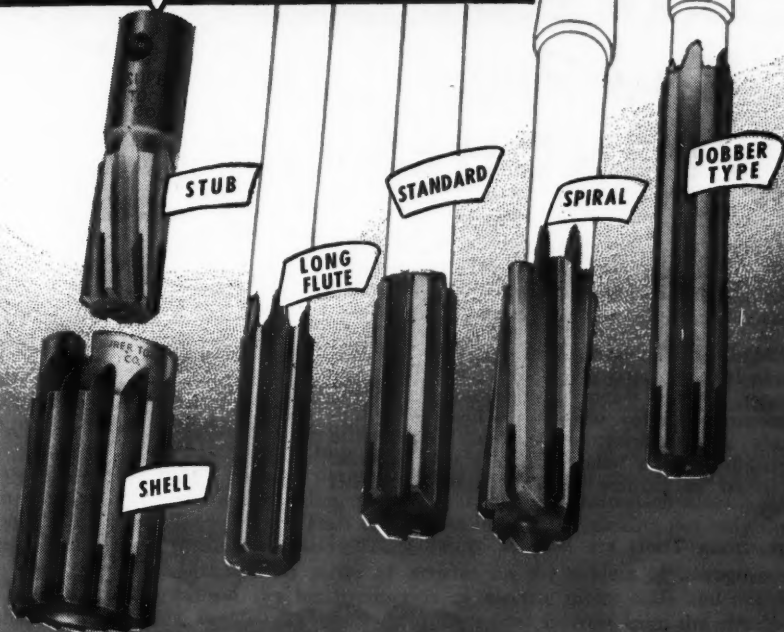
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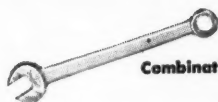


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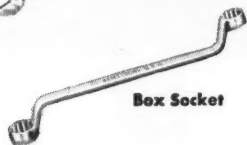
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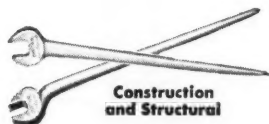
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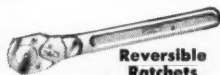
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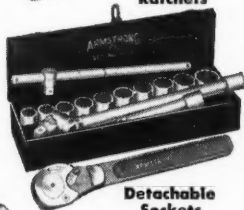
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MODERN Machine Shop

NOVEMBER, 1948

VOL. 21, No. 6

CINCINNATI, OHIO

This Month

In the feature article of this month's issue, T. E. Eagan, Chief Metallurgist, The Cooper-Bessemer Company, discusses the various characteristics of cast iron which must be carefully considered if the user of this material expects to obtain the best results. During the past 20 years, a number of improvements have been made which indicate a wider application of cast iron. These improvements in the quality of cast iron, according to Mr. Eagan, enable manufacturers to use this material for a wider variety of workpieces than ever before.

In his prize winning paper "All-Welded Jigs and Fixtures for Freight Car Parts," page 120, C. H. Blaine, Welding Engineer and Assistant Superintendent, Pullman Standard Car Manufacturing Company, tells how jigs were designed and constructed for welding operations. Of particular interest are the actual labor and material cost figures which Mr. Blaine has recorded for each job.

Thomas Trail's article "The Importance of Tool Design in Machining Aluminum" contains practical data which is designed to aid those of our readers who are engaged in machining aluminum. Conceding that a great deal of information already has been published on this subject, Mr. Trail undertakes the task of picking out only the more important phases for his discussion. Page 148.

Mr. Hinman continues his series of articles on the subject of "Progressive Die Design" by describing a die for production of electric meter seals and one for dry shaver razor heads. Both of these dies are of unusual interest from the standpoint of the fragile workpieces each die is designed to produce. Page 162.

We feel that all of our readers will be interested in the views expressed by A. G. Bryant regarding the European Recovery Program in his message "European Recovery vs. Relief," page 174. The author recently returned from a trip to Europe in which he visited practically all of the countries that are concerned with the outcome of the United Nations Conference.

The usual fine assortment of ideas submitted by our readers appears on page 182. The ideas included in this month's section are as follows: "Lathe Tool Post Insures Accurate Height Setting"; "Universal Sine Plate"; and "Modernizing Old Grinders."

News of the industry will be found on page 196.

The most recently developed metal-working equipment that has been placed on the market will be found in the "New Shop Equipment" section beginning on page 212.

You will find this month's cartoon on page 364.

When and How to Use Cast Iron

Generally speaking, the untiring search by the metallurgist in the laboratory for methods to improve the quality of gray iron has resulted in the development of a number of gray iron materials which were unheard of 20 years ago. Gray iron no longer is recommended for use because of the ease of casting alone, or because of the low cost. Metallurgists have improved its quality to a point where it is considered an engineering material which, if properly employed, will perform with outstanding results. In this article we will touch briefly on each of the physical properties of cast iron.

By T. E. EAGAN

Chief Metallurgist, The Cooper-Bessemer Company

THE title of this paper is presumptuous to say the least. The individual design of each part must be considered in the light of the service intended before the type of material may intelligently be chosen, therefore it is the prerogative of the designer to say when cast iron should be used. All that a metallurgist may do is to present the physical properties of cast iron in order that the designer may have at his disposal that information when making his decision.

The gray iron of today is quite different from the gray iron of some 20 years ago. It is no longer a material that is selected only for its castability and cheapness, accepting its low tensile strength and extreme brittleness. Metallurgists have improved its quality to the point that, if properly applied, it will give outstanding performance. In this article we will touch briefly on each of the physical prop-

erties that have been developed.

Gray iron can be very broadly called steel plus graphite. Microscopically, a good grade of material will appear as shown in Fig. 1. The gray streaks are graphite and the "thumb print" areas are those which may be found in a piece of annealed 0.90 carbon steel.

The graphite occupies 11.00 to 17.00 per cent of the volume of the metal, depending upon the analysis and the cooling rate of the casting, and determines to a large extent its physical characteristics. If all of the graphite in a casting could be rolled into a ball and placed in the center of a casting as shown in the top diagram of Fig. 2, it would have little effect on the strength. Again, if the graphite were placed in the form of a slab across the casting, as shown in the lower diagram, the casting would have no strength whatsoever. Therefore, by controlling the distribution and the

amount of graphite it is possible to produce various strengths of gray iron. The different patterns of distribution of graphite are discussed in a publication issued by the A. S. T. M. as Specification A247-41T.

Tensile Strength

Due to the fact that the tensile strength of gray iron indicates to a certain extent other desirable properties, the general rule has been to specify tensile strength as the criterion for the purchase of castings. This procedure is based upon the A.S.T.M. Specification A-48, in which are listed the various classes of gray iron normally available. The tensile strength designation is derived from a test which is performed with a separately-cast bar not attached to the casting, various sizes of bars being tested, depending upon the section thickness of the castings. Table 1 contains a summary of the specification.

Why do we have seven different classes of gray iron? In the first place, the lower the class number of iron des-

ignated, the cheaper it is. Thus the factor of economy is a consideration. Secondly, the higher classes of iron are very difficult to cast in thin sections. The table indicates the usual minimum sections that can be economically used, but they are not mandatory. Should thinner sections than are indicated in the table be desired,

a foundryman may be consulted to see if the design of the casting will permit him to gate it so as to allow the iron to flow through the thin sections.



Fig. 1—Illustration Showing the Microstructure of a Good Grade of Gray Iron. X500. Etched-Picral plus HCl.

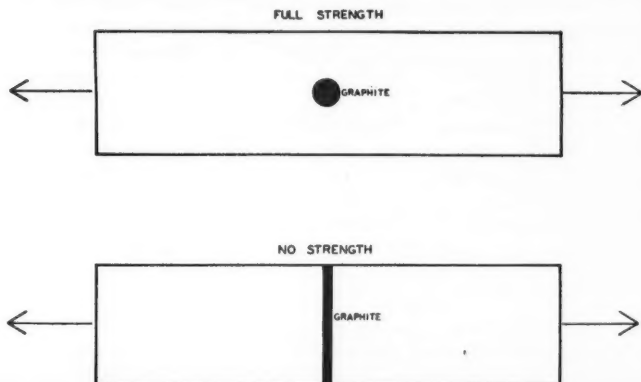


Fig. 2—Illustration of the Influence of Graphite on Tensile Properties of Gray Iron

Section thickness has a great deal to do with the tensile properties obtained in any casting. The upper part of Fig. 3 indicates to a large extent what happens to the tensile strength as the section thickness increases or decreases from the size of the arbitration bar used. The slope of these curves becomes rather steep as the section size in the thinner sections is changed, but as the size of the section is increased, the curves tend to flatten out, which indicates that in the thicker section there is less change. There is also a tendency for the higher class of cast irons to show less drop in tensile strength than the lower class material.

The factor that determines the tensile strength of the material in any gray iron casting is the rate at which the metal cools from a molten state down to a temperature of around 1,000 deg. F. Therefore, it definitely can be stated that for any given analysis of material the tensile strength obtained in the casting is determined by its cooling rate.

Unfortunately there is very little which can be done about the cooling rate of any given casting because the

cooling rate is primarily controlled by the design of the casting, the size of the flask used, the method of gating, the sand used, and so on. These factors are pretty well fixed by the foundry practice required to produce sound castings. Therefore, to obtain a required tensile strength, the chemical analysis must be controlled, and such control is entirely possible.

The practical aspects of the methods used are very complicated and require a considerable knowledge of the metallurgy of gray iron; but even so, it is being done daily with success. If a certain tensile strength is desired in a casting, the designer will be wise to consult the foundryman. Nine out of ten times he may be able to do the job if the customer is willing to cooperate with him on the design.

Figure 4 indicates the position that cast iron holds in relation to other cast ferrous alloys.

Yield Point

In design work it is customary to avoid stresses higher than the yield point of the material if the material is to be subjected to static loading. The

yield point of gray iron is very close to tensile strength; thus it is possible to use the material at higher stresses. Figure 5 shows the comparative yield strength of some of the cast ferrous alloys. From the data provided in this graph it can be readily concluded that the yield point of gray iron is comparable to that of low carbon cast steel.

TABLE I

Class	Tensile Strength Min. p.s.i.	Usual Minimum Wall Thickness—Inches
No. 20	20,000	1/8
No. 25	25,000	1/8
No. 30	30,000	1/4
No. 35	35,000	3/8
No. 40	40,000	1/2
No. 50	50,000	1/2
No. 60	60,000	3/4
Size of Section Inches	Nominal Dia. of Test Bar Inches	
0.50 and under		0.875
0.51 to 1.00		1.20
1.01 to 2.00		2.00
over 2.00	Larger bars by agreement between manufacturer and purchaser	

Fig. 3—Graph Showing Influences of Section Size on Tensile Strength and Brinell Hardness (Courtesy of American Foundrymen's Assn.)

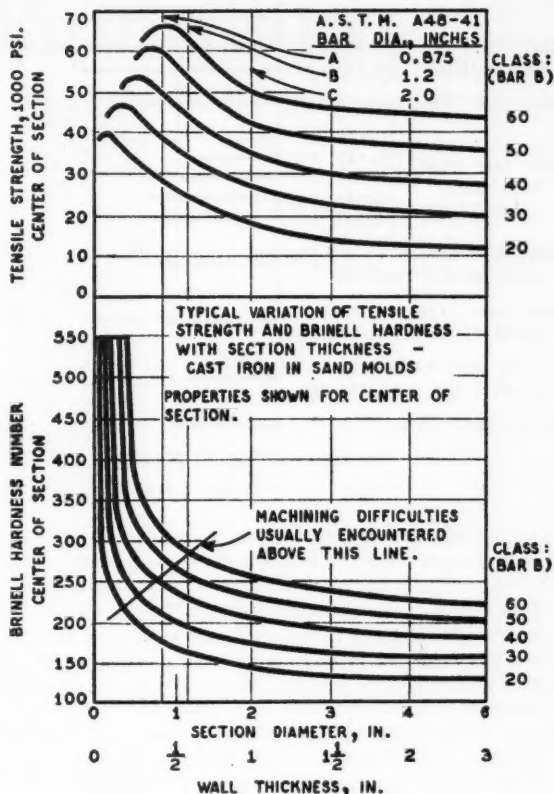
Compression Strength.

One of the outstanding characteristics of gray iron is its compression strength. In fact, gray iron is much stronger than steel in compression. The useful compressive strength of gray iron is graphically presented in Fig. 6. It will be noted that gray iron in all classes is much stronger than cast steel when used in compression.

Modulus of Elasticity

In design work, the modulus of elasticity is an important factor in most calculations. The modulus of elasticity of gray iron will vary between 12 million and 22 million p.s.i., depending upon the tensile strength, the amount and distribution of the graphite, and microstructure of the matrix. However, these figures must be used with discretion because cast iron is a heterogeneous material and does not fulfill the requirements of homogeneity, isotropy, and elasticity that are required of the elastic theory.

In many cases, cast iron behaves completely different than would be expected by the elastic theory. Briefly, the shape of the section influences the stress distribution and as the load increments are increased the neutral axis shifts and the stress distribution line follows a curve instead of a



straight line as in the case of a homogeneous material such as steel.

A rather complete discussion of the proper method of using the elastic theory formulas for cast iron is presented in the "Cast Metals Handbook" published by the American Foundrymen's Association. This book was written with the idea that it would be of especial value to designers and engineers, and therefore is filled with information of interest to them.

Endurance Limit

Cast metal parts that may be subjected to dynamic forces are usually designed so that the stresses imposed

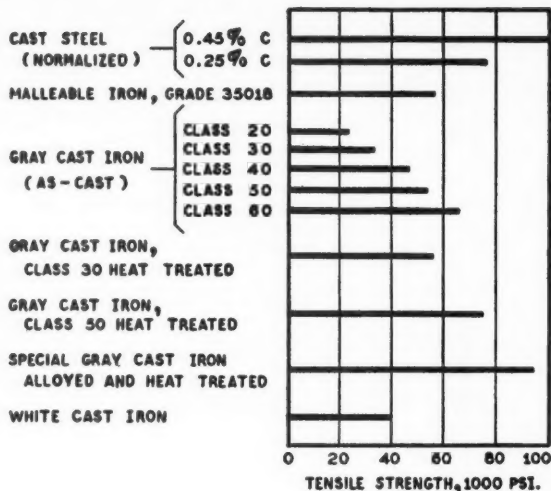


Fig. 4—Graph Showing Typical Tensile Strength in Castings of from $\frac{1}{4}$ to 1-inch Thickness. (Courtesy of American Foundrymen's Assn.)

limit caused by the notches was 50 per cent. In the case of iron, the reduction was 21 per cent.

Consider how this information applies to the selection of cast iron. Let us take, for example, a workpiece that could be made either of steel or cast iron. The steel we could use would have a tensile strength of 80,000 p.s.i.

are below the endurance or fatigue limit. In gray iron, the theoretical endurance limit varies between 35 and 50 per cent of the tensile strength. The 35 per cent applies to a very large section whereas the 50 per cent would apply to smaller sections which are comparable in cooling rate with that of the 1.2 inch arbitration bar. For most sections, an arbitrary figure of 40 per cent of the tensile strength can be safely used. As all designers and engineers know, the use of the theoretical endurance limit is subject to modification because of design and service requirements. This is true of any material. Let us consider one or two of the factors as they affect gray iron.

Notch Sensitivity

Gray iron is much less notch sensitive than steel. This condition is amply illustrated in Fig. 7, which shows the endurance limit in reverse bending of steel unnotched and notched as shown. The material was an SAE 1040 steel, heat treated to 80,000 p.s.i. tensile strength. The tensile strength of the gray iron was 49,000 p.s.i. In the case of steel the reduction of the endurance

which, in this case, would have an endurance limit of 35,000 p.s.i. and, because of the notches in the design, would have a maximum allowable stress of 17,000 p.s.i. However, the cast iron for the same workpiece has a tensile strength of 49,000 p.s.i. and an endurance limit of 16,500, but because of its non-notch sensitivity, a maximum allowable stress of 13,000 p.s.i. can be used which figure is only 4,000 p.s.i. less than that for steel. Since the factor of safety usually plays an important part in calculations of this type, it would be amply safe to use the cast iron in place of the steel.

The foregoing comment is not intended as a condemnation of steel or as a claim that cast gray iron will always take the place of steel. This is not so, because for other service requirements such an analysis as given above may be incorrect, and the cast steel or forged steel would be much better. The point being made here is that all too often steel castings are specified for parts that could be just as well made of gray iron. In those cases it is a misapplication of the steel.

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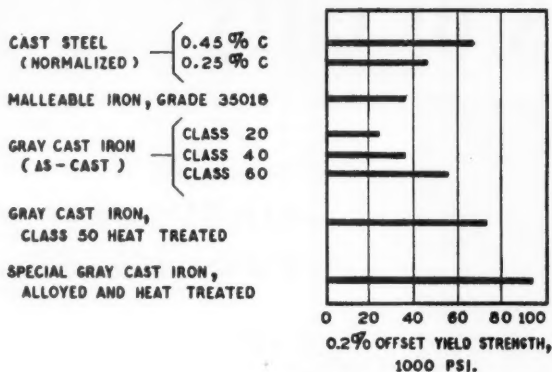


Fig. 5 — Graph Showing Comparative Yield Strength of Various Cast Ferrous Alloys.
(Courtesy of American Foundrymen's Assn.)

practical in a cast shaft as it is almost impossible to machine such a contour economically.

Damping Capacity

Under dynamic operation, many failures of parts are caused by the vibration that may be set up in the piece due to the dynamic forces. An example of this condition is found in the critical vibration experienced in crankshafts of internal combustion engines. This critical vibration can and does, at times, cause failure of parts in operation.

Gray iron has excellent damping capacity. The lower the tensile strength of the iron, the higher the damping capacity. One of the best ways to demonstrate damping capacity is the one used in many machine shops for identifying the material in a casting; namely, to strike the casting. A steel casting will ring, while a cast iron casting will produce a dull sound. It

With further reference to the notch effect of stresses, a considerable amount of relief can be effected by proper contouring. However, contouring must be done intelligently and, in this regard, the use of the new SR-4 strain gages can be of great help. The following example of contouring will serve to show what can be done in actual practice.

Figure 8 shows a cast gray iron crankshaft that has a tensile strength of over 65,000 p.s.i. The notch effect at the fillets between the webs and the pins and journals normally imposes a stress concentration of over 2 to 1 for a forged steel shaft and 1.75 to 1.00 for the high tensile iron. However, by contouring as shown, the stress concentration is almost completely eliminated. The shape of the contour was determined by the use of SR-4 strain gages. It can be readily appreciated that such contouring is only

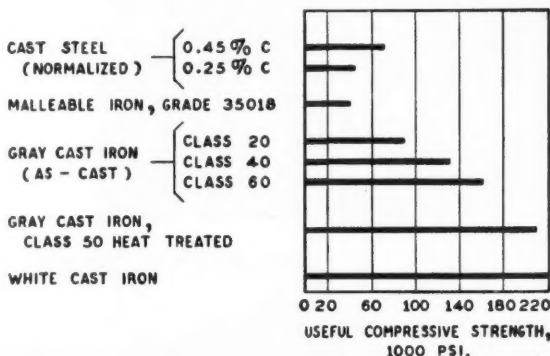
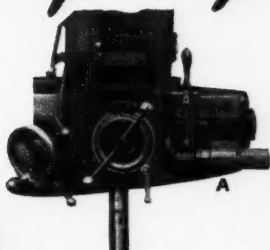
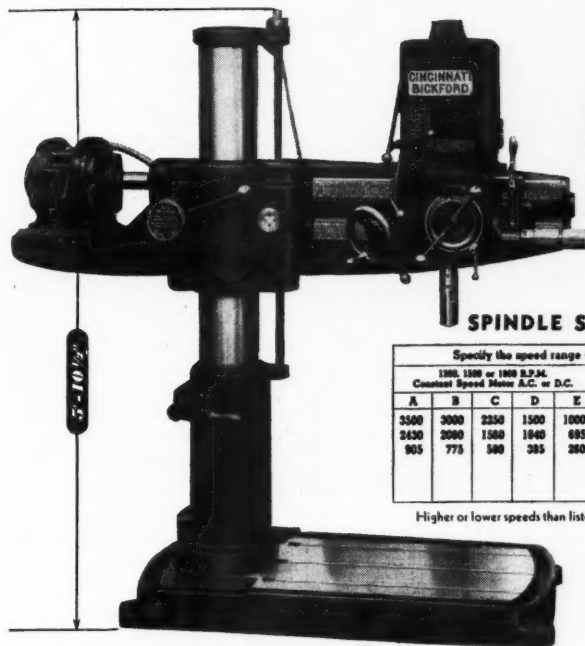


Fig. 6 — Graph Showing Useful Compressive Strength in Castings of from $\frac{1}{2}$ to 1-inch Thickness.
(Courtesy of American Foundrymen's Assn.)

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A	B	C	D	E	F	G	H	I	K
3500	3000	2350	1500	1000	3500	3000	2350	1500	1000
2630	2000	1580	1040	685	2430	2080	1560	1040	685
905	775	580	385	260	1750	1500	1125	750	500
					1215	1040	780	520	345
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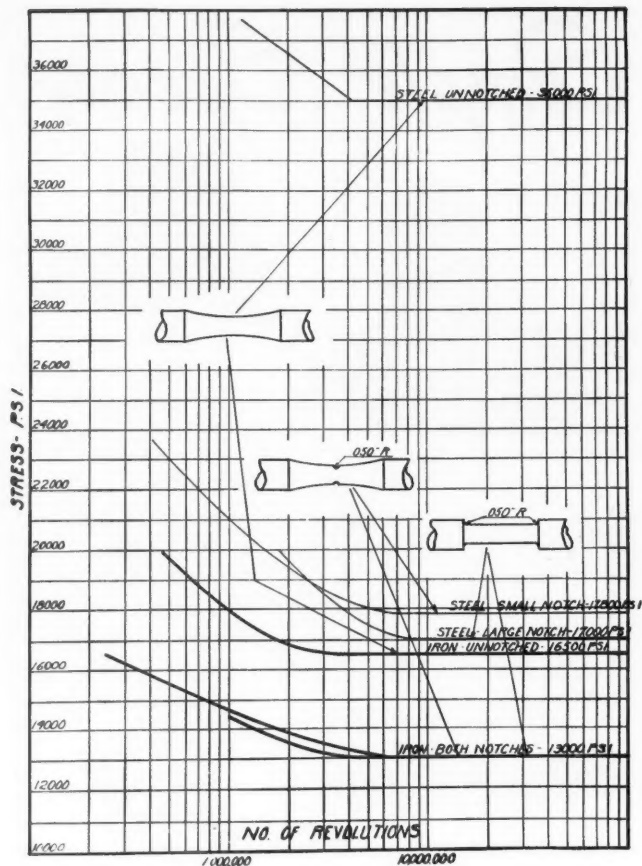


Fig. 7—Graph Showing Effect of Notches on Endurance Limit of Steel and Gray Iron.

impression. Parts are designed so that the forces applied are well below the elastic limit of the material used; thus no permanent deformation is obtained. If this were not so, considerable difficulty with fits and running clearances would be experienced. Therefore, any amount of permanent deformation would no doubt be disastrous. The amount of deformation obtained under any impact blow which would be below that required to fracture is of importance. In many cases the impact blow

is difficult to apply dampening capacity to design but it is always well to know that it is present in gray iron.

Impact and Brittleness

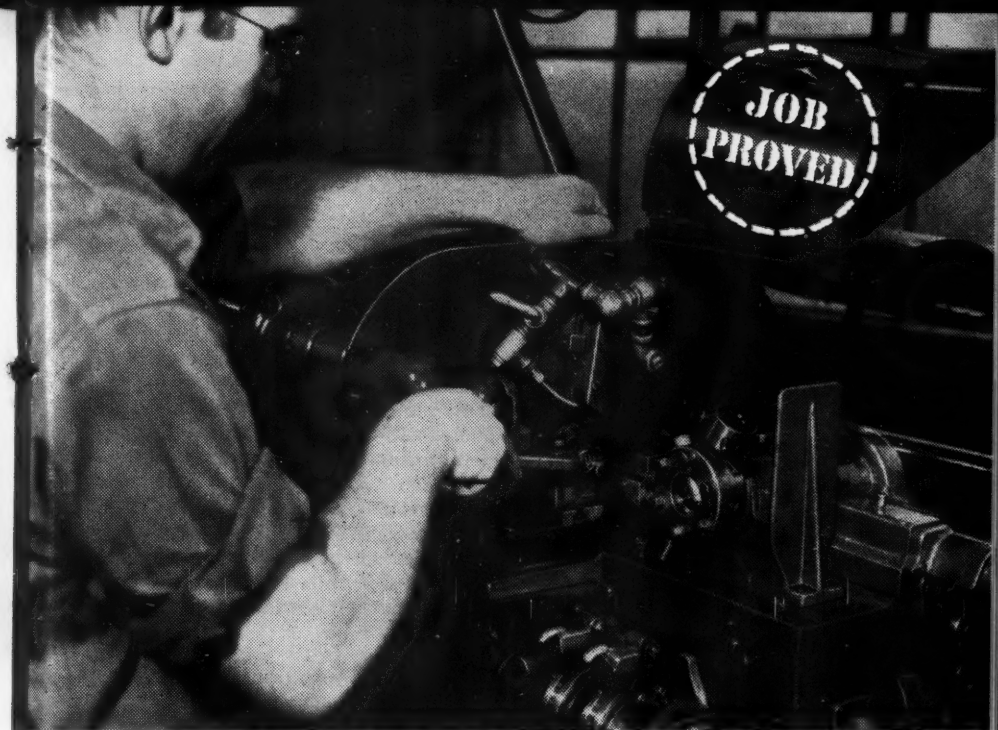
Gray iron is much more brittle than steel. Thus when gray iron breaks, it breaks with a brittle fracture while steel, being ductile, will break with a ductile fracture. The standard impact tests such as Izod and Charpy show gray iron to have much lower impact values than steel.

However, the testing of materials to destruction sometimes gives a false

that will break cast iron will deform steel to such an extent as to make it useless.

Castability

Gray iron is the most castable of all the ferrous metals. It will flow into thin sections and usually requires either small risers or none at all. However, as the tensile strength is increased, castability is reduced, with the result that more risers are required. This consideration is important when intricate designs are involved. Gray iron therefore lends itself to much more in-



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Fig. 8 — Cast Gray Iron Crankshaft Showing Contouring to Eliminate Stress Concentration.

tricate designs than do many of the other cast metals. Two outstanding examples of intricate designs cast in gray iron are the automobile engine block and head. These parts are masterpieces of intricate design which undoubtedly could not be cast in any other ferrous metal than gray iron.

Machinability

Gray iron, properly handled, is a very machinable material. This feature is illustrated graphically in Fig. 10. It will be noted that the lower tensile strength irons are much more machinable than the materials having higher tensile strength.

One of the complaints that is usually made regarding gray iron is the problem of hard edge. By the application of proper molding practice and proper control of the analysis of gray iron, hard edged castings may almost always be entirely eliminated.

Wear Resistance

In sliding friction, gray iron is outstanding. This is amply demonstrated by the fact that practically all engine cylinders or liners are made of gray iron. However, it is the microstructure of the iron that to a high degree determines the wearing qualities. The general rule holds that the iron should have a random flake distribution of

graphite and a matrix that contains no free ferrite. Castings which have the type of microstructure shown in Fig. 1 will have good wear resistance, while those with the type shown in Fig. 11 will have exceedingly poor wear resistance.

In abrasive wear resistance, gray iron also does a good job. However, if the iron is hardened by heat treating the wear resistance is sometimes increased. In the case of very abrasive conditions, a white or chilled alloy cast iron such as Ni-hard is usually recommended.

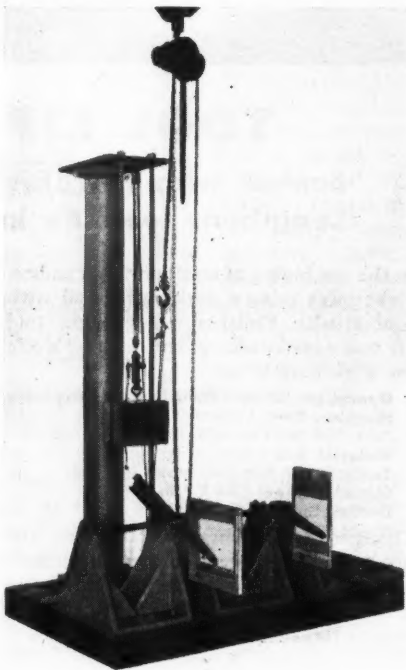


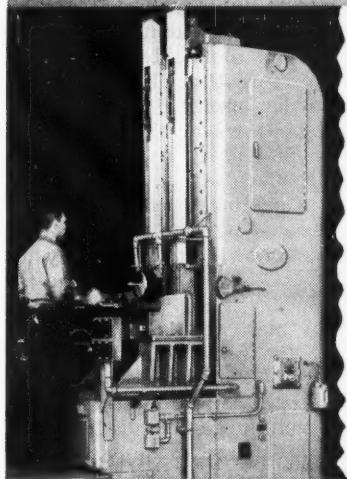
Fig. 9—Torsion Impact Machine. Bar at Left is Gray Iron. Bar at Right is Forged Steel.

DIFFERENTIAL CASE HALVES

FINISH BROACHED FROM THE SOLID
IN ONE OPERATION



Three progressive views of differential case half (shown about 1/4 actual size), broached on an American SB-66-15 surface broaching machine. Left: unbroached part; center: mating grooves broached on left-hand fixture; right: completed part with two additional grooves broached on right-hand fixture.



American SB-66-15 surface broaching machine tooled for broaching differential case halves. Interchangeable locators are provided for broaching either the large part shown or the mating half.



Finish broaching from the solid is an important advantage of this American engineered job. On this American single ram pull down machine, a full 66" stroke is used in broaching differential case halves. Half round mating grooves are rough and finish broached from the solid in one pass.

The malleable iron parts are first located in the left-hand fixture, with location taken from boss and counterbore, and index from flange hole. Location for second pass on right-hand fixture is also taken from boss and counterbore, and index from the previously broached slots.

Counterbalanced clamps are manually operated. Hardened and ground holders are guided in the fixture to hold tolerance and maintain accuracy. These holders are connected to the machine slide. Broach sections are removable for fast resharpener and have taper wedge adjustments behind the full round finish sections.

This unit duplicates a previous installation which has broached these automotive case halves to the customer's satisfaction for over ten years.



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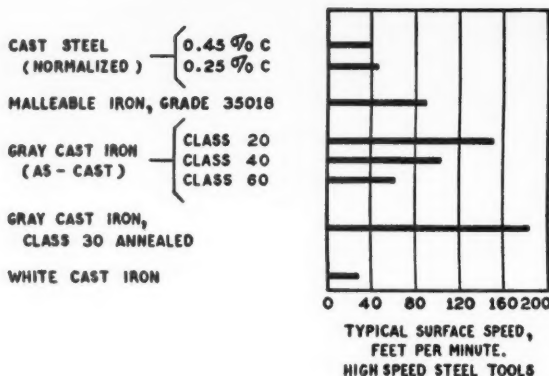


Fig. 10—Graph Showing a Comparison of the Machinability in Castings of from $\frac{1}{2}$ to 1-inch Thickness.
(Courtesy American Foundrymen's Assn.)

a factor, proper alloying of the iron can eliminate this tendency to a great degree.

Chemical Analysis

Corrosion Resistance

Another quality of gray iron is corrosion resistance. This is amply demonstrated by the fact that water mains have been made of cast iron. There are many examples of water mains which are still in good condition after 100 years of service. Cast iron heads, cylinder liners, and blocks in engines which are salt water cooled have been used for years with excellent success. However, where highly corrosive conditions are encountered, special corrosion resistant grades of gray iron are recommended.

Heat Resistance

Gray iron has good heat-resistant qualities. Recently the A.S.T.M. developed a specification for the use of gray iron for use in pressure vessels at temperatures up to 650 deg. F. We also know that it has been successfully used in non-pressure vessels such as molten metal pots, and so on, for temperatures above 1200 deg. F. Gray iron will not, however, replace the higher alloy heat-resisting steel castings where their use is actually required.

One of the complaints about gray iron is its tendency to grow when heated above 900 deg. F. Where this is

The chemical analysis of the iron determines, to a large extent, the physical properties of the casting, chiefly because there is so little that can be done to control the cooling rate of the casting in the mold. It would seem logical therefore that the one factor that should be specified is the chemical analysis. However, this is far from the truth; in fact, it is dangerous to make this specification. The method by which a casting is poured will influence the cooling rate tremendously and there may be a number of ways to pour which will produce the same result.

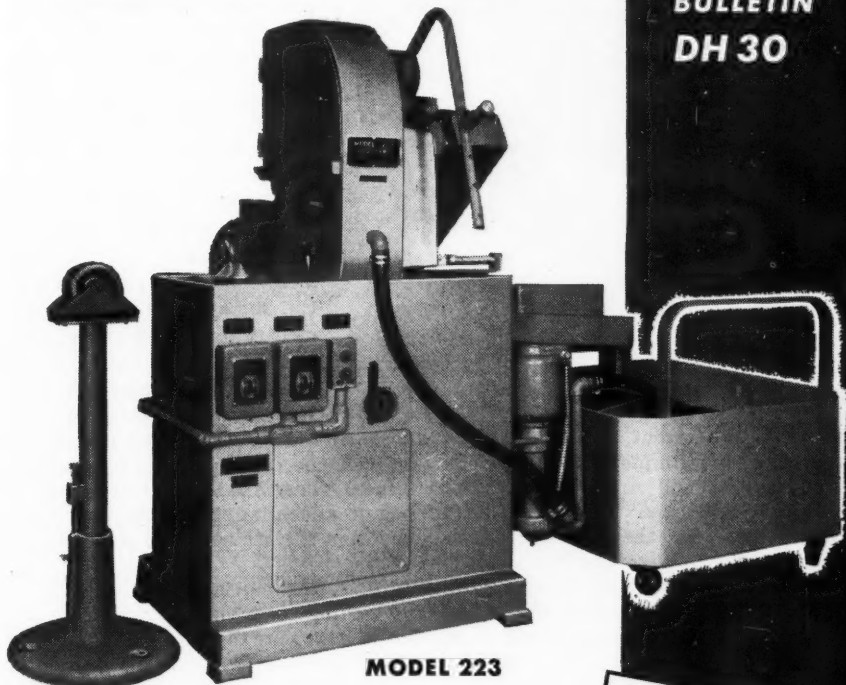
The only man who is in a position to specify the proper analysis for a given casting in which the certain physical properties are required is the foundry metallurgist, and he must make his decision after he has had an opportunity to check the method of molding, the gating, and so on. Thus, it is far safer to let the foundry specify its own analysis. This is well recognized by the fact that the A.S.T.M. specifications deliberately avoid specifying chemical analyses. All foundrymen are perfectly willing to work to a tensile strength specification, but many will absolutely refuse to work to tensile strength and also chemical analysis.

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- Automatic Work Stop • Automatic Coolant Pump Operation
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DH 30**

CAMPBELL
Abrasive Cutters
and Nibbling Machines

Heat-Treatment of Gray Iron

Gray iron can be heat treated in much the same manner as steel. It is possible to almost double the tensile strength by heat treatment. However, this procedure involves a quench and

come distorted. These stresses can very safely be removed by a stress-relief anneal. This process consists of very slowly heating the casting to about 1000-1050 deg. F., holding it there for about one hour per inch of heaviest section and cooling it very slowly.

Now, a word about the idea of aging of gray iron castings. It has been believed for years that the best way to relieve casting stresses was to store the casting out in the open for 6 months to a year so that the extremes and variations of climatic temperatures might relieve the stresses. Experiments have shown that this "weathering" does not relieve the stresses. What has happened in the cases that have shown less distortion in machining after such a treatment is that the stresses, being more or less concentrated on the surface, have been relieved because the surface has rusted sufficiently to remove some of the surface-metal, removing some of the stresses also.

It is a much more economical and a much better practice to subject the castings to a stress-relief anneal. The Studebaker Corporation began annealing their cylinder block castings for stress relief way back in 1915.

Gray iron can also be hardened by quenching and drawing. The maximum hardness that can be obtained is about 550-600 Brinell. This hardening treatment is of great value for certain services; for instance, where abrasive wear is encountered such as on the ways of lathes and machine tools, certain dies, and sometimes Diesel engine liners. Any of the usual methods of hardening can be employed plus aus-



Fig. 11—Illustration Showing a Type of Microstructure of Gray Iron that Has Poor Wear Resistance. X500—Etched-Picral and HCl.

tempering treatment, and can only be applied to very simple shapes. Complicated shapes will crack during the quenching operation. The use of heat treatment to increase tensile strength is sometimes dangerous because it does not proportionately increase the endurance limit of the iron; therefore, one can be greatly misled when such heat treated materials are to be subjected to dynamic forces.

Gray iron castings of complicated design, especially those in the range of 40,000 p.s.i. to 60,000 p.s.i., usually have a considerable amount of residual stresses in them. Thus, in subsequent machining, they are likely to be-

tempering, flame hardening, or induction hardening.

Some use is made of a direct annealing process on certain pieces of gray iron to improve machinability. Annealing definitely lowers the physical properties of the casting and should not be used unless these physical properties are of no consequence.

The principles of good casting design are the same for steel, cast iron, or the non-ferrous metals. The subject is covered in great detail in the first five chapters of the *Cast Metals Handbook*. In general, the things to avoid may briefly be covered by stating that the sections of the castings should be as uniform in thickness as possible, and that ample fillets should be allowed in corners. Any major change in section should be taper-blended instead of being filleted. The casting should be so designed that it can be divided into two halves without having an irregular parting line; the design should be such that the casting will solidify properly. From the economical point of view the casting should require the simplest possible core setup.

The best suggestion that can be given is to make up, perhaps rather roughly, the design that is considered most satisfactory, then consult a good foundryman and get his suggestions. You will be surprised at the results you obtain.

One More Difference. When contemplating the joys of government ownership and monopoly, remember this. In Russia there are 55,000 miles of railroads—all, needless to say, owned by the government. To operate this layout takes approximately one and a half million people. In the United States we also have nearly a million and a half railroad employees (1,350,000 in round figures). But under our free enterprise system they are able to operate 237,000 miles of railroad—more than four times as much as the Russians.

—Manufacturers Record.

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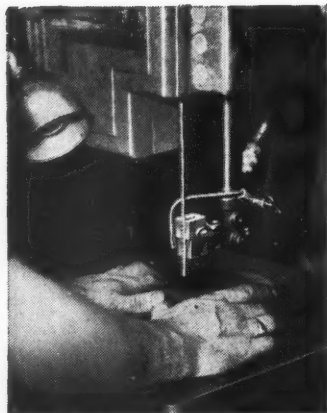
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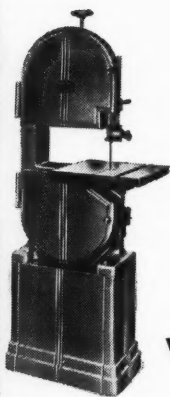
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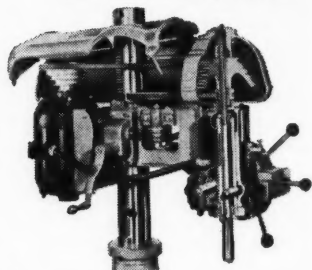
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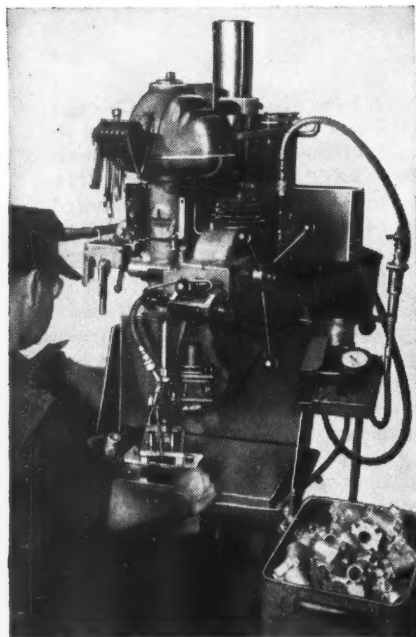


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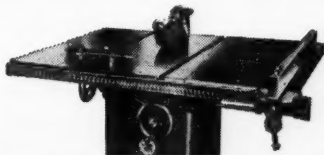
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RADIAL METAL CUT-OFF MACHINES • MOTORS

Photo, left: Wahlund's set-up on standard 20" Walker-Turner Power Feed Drill Press. Here shown machining castings for tractor umbrella.

**Photo, above right:* 20" Power Feed Drill Head, Model D-1101X. 4 ball bearings, 6" spindle travel. Five standard spindle speeds, 400 to 2600 r.p.m. with 1740 r.p.m. motor. Capacity 1" in cast iron, 3/4" in steel. Slo-speed motor optional.

Photo, above left: Operator using Walker-Turner 14" Band Saw to cut steel for dies. At Wahlund's this band saw also cuts materials for jigs, tools and other parts.

***Photo, above center:* 14" Metal Cutting Band Saw, Model MBN-935. Blade speeds from 61 to 4630 F.P.M. Weight, less base and motor, 350 lbs.

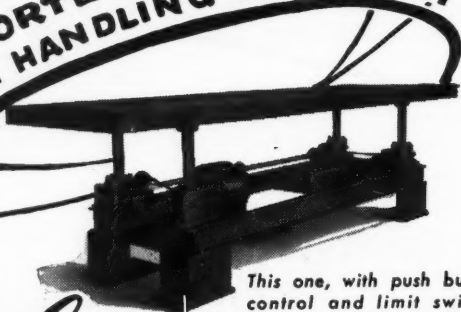


10" Tilting Arbor Saw, TA-1180 B. Cuts to depth of 3", angle cuts to 45°, accurate miter gage. Price: less motor, switch, extension tables, guard and splitter, \$150.00.

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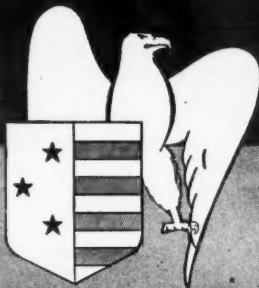
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Send for Bulletin No. 87

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THE AMERICAN TOOL WORKS CO.
Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

All-Welded Jigs and Fixtures for Freight Car Parts

This paper received an award in the recent contest sponsored by the James F. Lincoln Arc Welding Foundation for the best papers submitted on the applications of arc welding.

By C. H. BLAINE

Welding Engineer and Assistant Superintendent
Pullman Standard Car Manufacturing Company, Butler, Pa.

THE firm with which I am connected manufactures railroad freight cars for many companies, some of which have been obstinate in changing to arc welding. However, great progress has been made, and we continue to sell arc welding to those who, in the past, have been "scoffers" at welding, by convincing them of the many benefits to be gained by the use of the arc welding method when applied to the fabrication of freight car parts. Some of these established and proved benefits are: lighter material with equal or greater strength; less corrosion; saving in material; less deadweight and more payload.

All parts of a car can be constructed and erected by arc welding, yet it is competitive throughout all procedures. When constructing weldments for production of our products, we are competing with other manufacturers of like products, made of different material or by a different process. Therefore, it is necessary that we follow a procedure that has the least resist-

ance to speed and quality in order that we may reduce the cost of manufacturing either welded or riveted parts, and in our experience we have found that welded jigs and fixtures are the most essential equipment for speed, for quality, and in lowering cost of fitting, tack welding, and welding.

We build jigs and fixtures of all-welded construction that are adaptable for constructing and welding all the parts of freight cars. In order to be equipped for efficient mass production, many of the welded jigs are designed for car parts of different types and dimensions and thus they help "cut corners" in reducing man-hours, lowering costs, and speeding up starting production.

Fitting, Tack Welding, and Welding Jig for Center Sill

Figure 1 shows a new, improved type of jig which is a part of our new freight car center sill welding unit, which was recently placed in opera-

tion. This jig is designed for fitting, tack welding, and welding different lengths of "Z" bars together by seam welding the top flange. Two "Z" bars are placed in the jig (one reversed so that top flange edges meet on top of jig); the welder operates air valves, causing the cylinders to pull the ends of bars down to the proper camber and push them together as far as the spacers will allow, and the welders then gauge, tack weld and seam weld where top flange edges rest on a copper back-up bar. This weldment, the center sill of the car, is then removed from the jig.

This jig is all arc welded except for the welded spacers which are bolted to jig top beam to facilitate their removal for welding and machining to the correct dimension of the inside width of the center sill when they become worn. The rocker web at the end of the jig is also bolted to the lower frame. The two sets of pull-down clamps at each end of the jig have indi-

vidual air cylinders that can be moved to correspond to the length of the sill being welded. Each pair of push-up clamps is also actuated by an air cylinder. All of the clamping units are suspended from the adjustable part of the jig, which rests on three adjustable wedge units which raise the suspension to the desired arc to form a camber that will be great enough to cause the center sill to return to its original straight form when it cools from the welding heat, or to establish a specified camber if the railroad company or customer desires one.

This jig simplifies fitting and tack welding and also permits the use of larger welding rods at a higher heat. Two welders can produce two and one-third completely welded center sills (42 feet long) per hour, which is equal to 882 feet of arc welding, using 152 pounds $\frac{1}{8}$ x 18-inch welding rod at 65 per cent penetration per 9-hour day. Any length of center sill—from 20 feet to 51 feet—can be constructed in this



Fig. 1—View of Jig which is Designed for Fitting, Tack Welding, and Welding Different Lengths of "Z" Bars Together by Seam Welding the Top Flange.

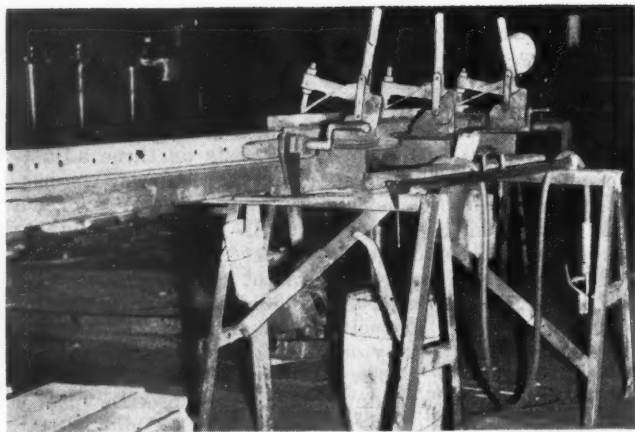


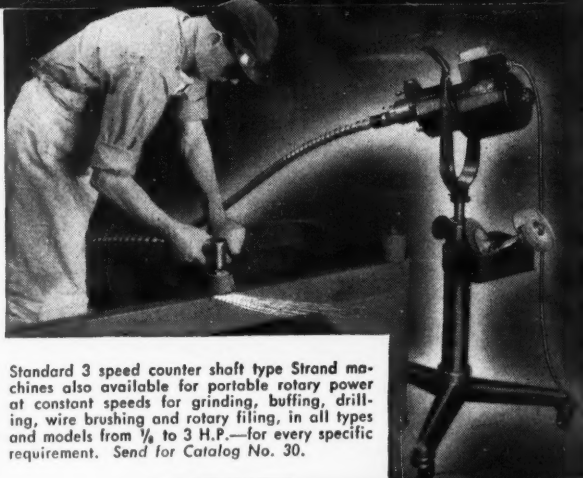
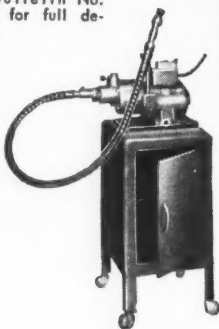
Fig. 2 — View of Fitting and Tack Welding Jig Designed for Welding the Shutter Guide to the Side Post of a Box Car.

jig with camber or predistortion up to four inches. The lower frame of the jig could have been riveted, but when an estimate of the cost was made, the all-welded jig cost \$344.75 less than a riveted frame with a welded adjust-

able top; therefore, the jig was built by all-welding, at a cost of \$6,736.97. The savings is very small over the cost of the jig with a riveted lower frame and welded adjustable top, but we get more production and a better class of work. However, by "repeat" orders—even with the small savings involved—the jig will not only pay for itself in time, but will stimulate prod-

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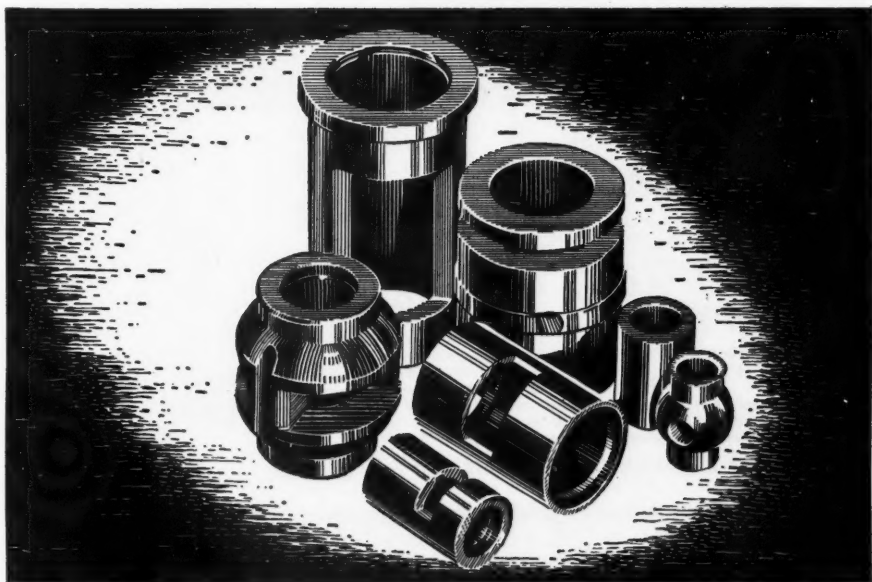




Fig. 3 — Illustration Showing Welding Jig Which is Designed for Welding the Guide to the Side Post After it Has Been Fitted and Tack Welded.

welded jigs cannot be duplicated by any other process of construction.

ress in arc welding more car parts, where greater savings will be realized by improving the procedure with other welded jigs and fixtures.

Some months ago we started a 5500 lot of box cars which were of a different type than we had previously built in our plant, and, therefore, required a new set of jigs. Following is a description of some of these welded jigs which would indicate that most arc

Shutter Guide to Side Post "Fitting and Tack Welding" Jig

Figure 2 shows a "fitting and tack welding" jig for the shutter guide to the side post of a box car. This jig was designed and built at the same time by one welding supervisor and one welder in 8½ hours, using surplus pieces of material (except the clamps and welding electrodes); flame-cut to

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DETROIT POWER SCREWDRIVERS

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Tooth File (Flat Rigid tanged type)

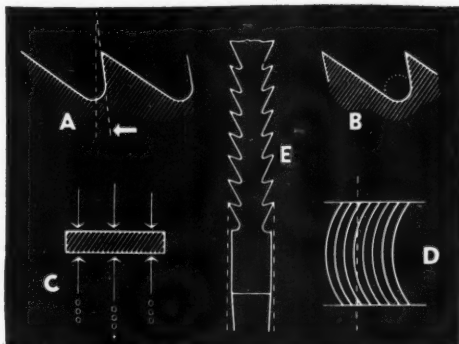
NICHOLSON SUPERIOR MILLED CURVED TOOTH FILES

are widely used by the automobile manufacturing and repairing industry on body work. They are also of great practical value in many other types of shop work. Ideally fitted for smooth work on sheet and other steels up to the hardness of commercial annealed tool steel; and on cast iron, bronze, aluminum, zinc, babbitt, lead and plastics.

CONSTRUCTION. (A) Teeth have the proper face angle (positive) for good bite without pinning up. (B) Gullets are smoothly rounded for minimum clogging. (C) Cross-section has slight fullness for even tooth wear and level cutting. (D) Tooth radius is designed to keep at least two teeth in contact with the work along any one line. Greater shear angle at edges results in smooth cutting and less pressure, less clogging. (E) Pre-forged tang (in Rigid tanged type)

has teeth stopped off to leave a clean shoulder *below level of teeth-tops* — allowing file to be used as a surfacing tool.

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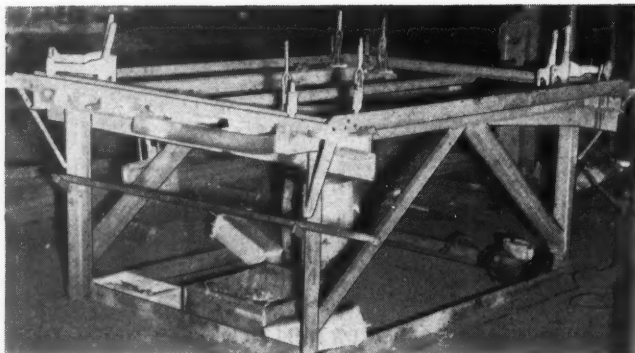


Fig. 4—View of Fitting and Tack Welding Jig Designed for Welding Door Frames.

Shutter Guide to Post "Welding" Jig

Figure 3 shows the "welding" jig for welding the guide to the side post after it has

length and arc welded, at a cost of \$55.02 (material \$35.90 and labor \$19.12). It would have been almost impossible to construct this jig by riveting, using like material. Forty-four thousand guides to posts have been fitted and tack-welded in this jig to date, and it is still in very good working condition.

been fitted and tack welded in the jig as shown in Fig. 2. In addition to being a positioning jig, it is made to pre-distort the guide and post two ways because the post is made of ship channel and the guide is welded to the flange, the weld stress draws it both ways.

To obtain the camber in the jig so

Heat Treat small parts *faster at less cost* with 'SURFACE' batch type Convection Furnaces—Pit and Oven Types . . .

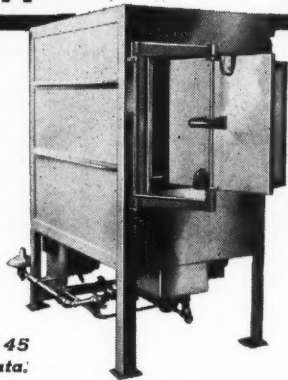
For heat treating operations below 1250° F—especially small parts such as bolts, screws, lock washers, fasteners, ball and roller bearings, small gears, springs, tools and dies, and similar parts, 'Surface' Batch Type Convection Furnaces do a faster job at less cost.

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that the weldment would be straight when cooled at room temperature, an estimated camber was produced in the beam by machine press before it was applied to the jig. Then, to obtain the exact camber, or pre-distortion, multiple arc welding beads were laid on the side and bottom until the stress of the weld produced the correct cambers. One camber can be seen in the picture and the other is obtained by turning the crank, which operates screws that push the post against top part of jig. The jig is built with trunnions on each end for positioning the work for welding, and as the guide has a $\frac{3}{8}$ -inch radius on both sides where it joins the post flange, it requires a deep fillet weld.

Positioning also helps the welders to make uniform welds, which is necessary in order to obtain the same stress in all weldments so that they return to the same shape. The welding of these shutter guides to the side posts for the car lot in question was started without jigs, but the fitting and welding was very slow, the workmanship was poor, and, in addition, a straightening operation was required which not only held up erection but also was very expensive. To eliminate these difficulties and get sufficient production of these parts for 40 cars per day, one fitting and tack welding jig and two welding jigs were built on the job, without drawings, by arc welding, at a cost of \$205.87, creating a saving in "fitting and welding" labor of ----- \$1,799.60 and in "straightening" labor 1,804.00

\$3,603.60

Less Cost of Jigs ----- 205.87

Total Savings on this

5500 car lot ----- \$3,397.73

Some small parts similar to the shutter guides to side posts previously referred to are being riveted, due to

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Whenever one end of a plug shows wear you merely unlock the handle, reverse the plug and lock it back in place. Length may be adjusted as desired. The positive locking action of the handle prevents slipping and gives these gages a rigidity equivalent to a solid gage.

Taft-Peirce Reversible Cylindrical Plug Gages (AGD Standard) are available in sizes from .025" to .510" inclusive both GO and NOT-GO. They are furnished in alloy steel, high speed tool steel, carboloy or chromium plated.

Taft-Peirce Reversible Thread Plugs, GO and NOT-GO, are available in



sizes ranging from No. 0 to $\frac{1}{2}$ " in both National Coarse and National Fine series. Steel only.

For additional information on these new Reversible gages write: The Taft-Peirce Mfg. Co., Woonsocket, Rhode Island.



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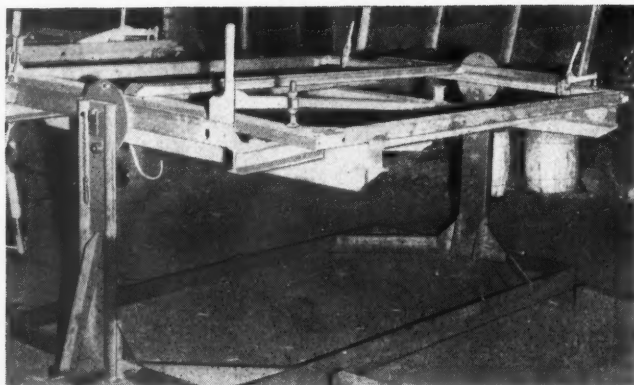


Fig. 5 — View of jig which was Designed to Hold Door Frames Rigid During Welding.

the fact that too often we consider the amount of saving in the production of a single unit only, and, to our way of thinking, it seems too small to bother with. Perhaps it was not worth so much consideration when we had to have the engineering department lay out every piece of material with every

wait for the fabrication department to shear and punch, with another wait for the riveting gang to prepare heating furnace and obtain the correct size rivets, hammer and dies to construct the riveted jig.

However, in these modern times our imagination runs in a different chan-

rivet hole in its proper location and had to have large overlaps and connection plates, heavy material and plenty of braces for a riveted jig, then

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nel and knowing what we can do with an all-welded jig or fixture and how much it will save in man-hours, even before we find out how much it will save it is in the making. Often this all-welded jig is started before the drawing is completed, and many such jigs are welded complete and operating without a drawing, as were the jigs which I have previously described and which are shown in Fig. 2 and 3.

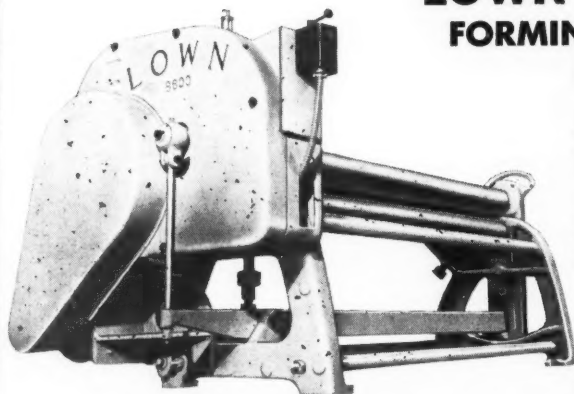
The design and use of modern, all-welded jigs is an important factor in being able to change car parts to weldments at lower costs. They not only simplify the fitting and holding of the parts to the necessary dimensions, but enable the welder to do a faster and better welding job by using a larger and hotter rod when the work is positioned by a light, easy-manipulating jig.

All car door frames used to be of riveted construction, for which it was necessary to fit, ream holes, bolt in a

jig and then rivet on the bench. However, we began our change in methods by welding fixtures to hold the door frames while tack-welding them, thus eliminating the bolts and speeding up the fitting. Later more welding was added and finally we used lighter frame material and "all-welded" construction. To compete with the riveted construction, the welding operation time had to be cut to a minimum in fitting, tack welding, and welding, and handling, all of which was accomplished by constructing light, sturdy, all-welded jigs.

Door Frame Fitting and Tack Welding Jig

When the 5500 box car job was received, we found that the side door frames were to be of welded construction, with no tolerance allowed in any of the fixed dimensions. Figure 4 shows the fitting and tack welding jig



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Fig. 6—View of All-Welded Underframe Fitting and Tack Welding Jig.

we designed and built for these door frames. It is of all-welded construction, with light structural shapes taken from stock (except the clamps which had been received for another structure but which could wait), and therefore we were enabled to complete all the door frame jigs by the time

side production was ready to start. Two fitting and tack welding jigs and two welding jigs are required for the 80 frames per day necessary to equip 40 cars per day to meet our schedule.

Door Frame Welding Jig

Figure 5 shows the welding jigs for the same frames as described and

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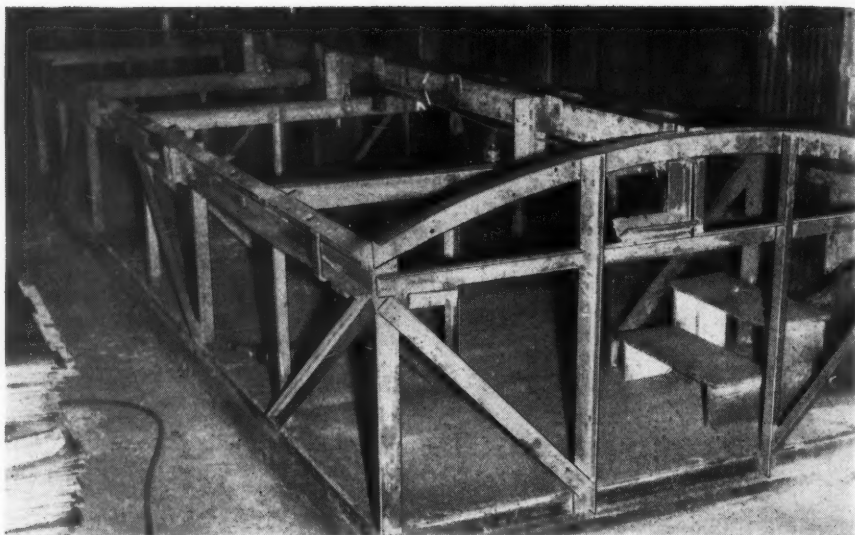


Fig. 7—View of Semi-Welded and Riveted Constructed Roof Fitting and Tack Welding Jig.

shown in Fig. 4. This jig is built to hold the frame rigid, while positioning it for welding and pre-distorting the bottom channel to eliminate straightening. This pre-distortion is obtained by welding riser plates to the center of the frame and pulling the frame sides down to gage blocks with heavy holding clamps before starting the welding. These riser plates are not shown in the illustrations, but the jigs had door frames in them when the picture was taken and the distortion can

be seen. Some parts were welded to the jig after the drawing was made.

Six welders handle all material, fit, tack weld, and weld 81 car door frames per day. Prices were set for six men at nine frames per hour, but they completed their work in seven hours, which actually increases their production to 11.57 frames per hour. This increase in production was partly gained by increasing the size of the welding electrodes over the estimated and starting size, but the price per

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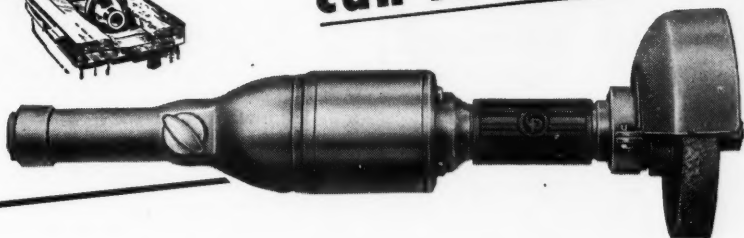
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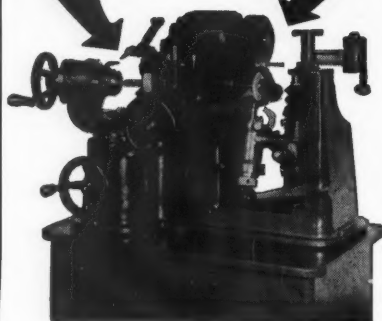
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piece was set and cost remained the same as when starting the job.

The complete cost of the four all-welded door frame jigs (two fitting and tack welding jigs and two welding jigs) which were required to meet our scheduled production of door frames per day, was \$514.98, and by their use we realized a savings in "fitting, welding, and straightening" labor (over the entire lot of 5500 cars) of \$3,038.02.

Underframe Fitting and Tack Welding Jig

The underframe of this car is of riveted and welded type and must be square and straight, with a tolerance in width and length dimension of only ¼ inch. Therefore we decided to build an underframe fitting and tack welding jig which must be exact in all dimensions and sturdy enough to resist the jarring it gets when the large members of underframe construction are being placed on it; also it has to take many hard blows of heavy sledgehammers.

Figure 6 shows the all-welded jig, of which two are required for 40 cars per day. A riveted jig would cost more because of the fabrication of material (shearing, offsetting and punching); more material (longer and heavier members—splice and connection plates) and higher labor cost in erecting, on account of the design being more complicated. Over 5,000 car underframes have been fitted and tack welded in these two jigs, and no repairs or corrections on either jig have been necessary. There are 126 items being fitted accurately in place and tack welded by 16 fitters and six tack welders, at the rate of five underframes per hour.

Shutter Fitting and Tack Welding Jig

Each box car requires eight shutters, constructed with eleven different items attached as follows: five items

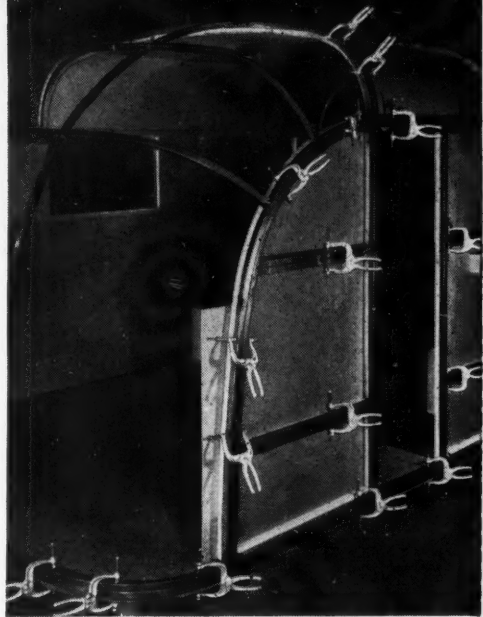
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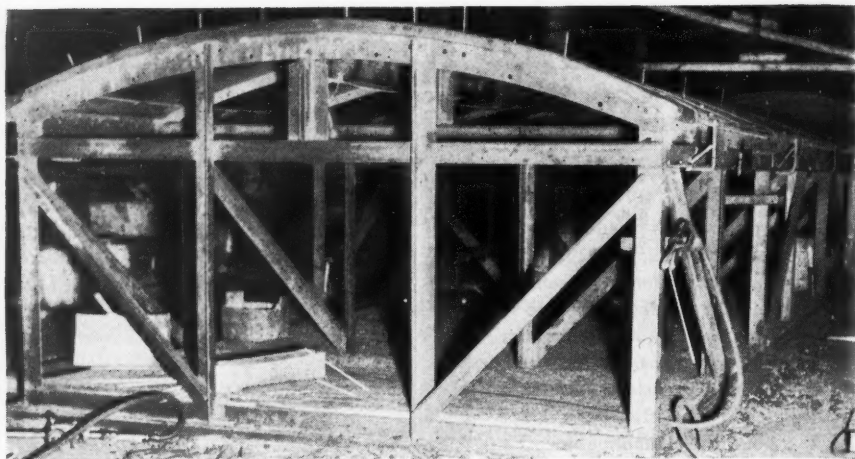


Fig. 8—View Showing Roof Being Fitted and Tack Welded in Jig.

spot welded and arc welded, three items arc welded, and three items riveted. For 40 cars per day, 36 shutters are required per hour (9-hour day). Two men fit and tack weld all items to 40 shutters per hour, at a cost of \$0.0673 per shutter. The cost of the all-welded shutter fitting and tack welding jig was \$85.41.

Roof Fitting and Tack Welding Jig

The roof of the box car is of semi-welded and riveted construction, and its dimensions must be accurately maintained to facilitate the final erection of the car. Figure 7 shows the

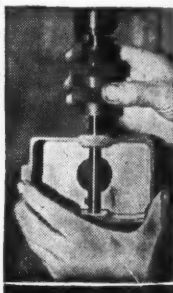
all-welded jig we constructed of light material, so that all parts of the roof can be accurately fitted and making all positions easily accessible where tack welding, welding, and riveting is to be done. This jig is not only accurately fitting, but it also simplifies the fitting so much that the human element is practically eliminated, except in placing the right items in their proper places to be pinned, tack welded and bolted to hold them to the jig dimensions until they are welded and riveted.

Figure 8 shows this roof being fitted and tack welded in the jig. It would

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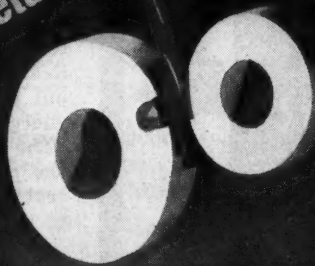


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be almost impossible to build a roof of this kind without a jig, therefore we built the most practical jig—an "all-welded" jig designed for speed in production, with a minimum of man-hours required for fitting, and without jeopardizing quality. Two jigs of this type were required to get the scheduled 44 roofs per day, at a total cost of \$1,240.70 (Labor \$323.38; Material \$917.32).

We have many other all-welded jigs which have been constructed since this lot of box cars was scheduled, but I believe that I have proved by this paper that the all-welded jig is the most economical jig to build. The all-welded jig costs less to build, the material cost is less, and it is the most stable equipment to advance and qualify welding to replace other methods of construction and erection.

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FOR a long time, scientists have been aware that the energy in coal and oil was put there by the sun. However, most suggestions that the solar energy might be more directly harnessed have been greeted skeptically by practical-minded men. However, Charles F. Kettering revealed in an interview recently that General Motors Research Laboratories have "blocked out the problem" of converting solar energy into fuel. Kettering added: "The hardest part of the job is always the problem of blocking out the correct research methods, and this has now been accomplished."

The General Motors scientist said it is hoped "to eliminate the time-consuming problem of aging vegetable materials in the ground in the natural but centuries-long process of making coal and oil." Other scientists comment that if a process is developed, the discovery will be "equal in importance to the discovery of nuclear fission."

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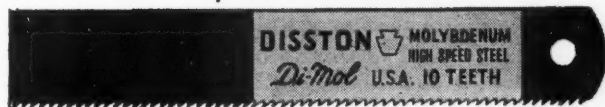
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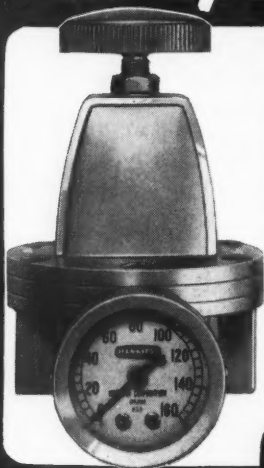
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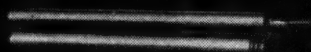
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The Importance of Tool Design in Machining Aluminum

By THOMAS TRAIL

ALUMINUM possesses characteristics that must be known if it is to be machined satisfactorily and with a minimum amount of wear of the cutting tools. Some aluminum alloys can be more easily machined than others. In general, the casting alloys which contain principally magnesium, cop-

per, or zinc are easiest to machine. Alloys containing more than 10 per cent carbon are generally considered to be the most difficult aluminum alloys to machine. Wrought alloys are easy to machine when the cutting tools are provided with relatively large rake angles.

Tools for machining aluminum should be given more top and side rake than for steel; the cutting edges should be kept sharp and free from burred or wire edges, and the cutting surfaces should be maintained smooth, bright and free of scratches.

Usually where recommended cutting speeds are necessarily low, plain high carbon tools perform satisfactorily. High speed steel tools are generally used on production work, but cemented carbide tools may prove superior. When properly ground, cemented carbide tools produce excellent machined surfaces

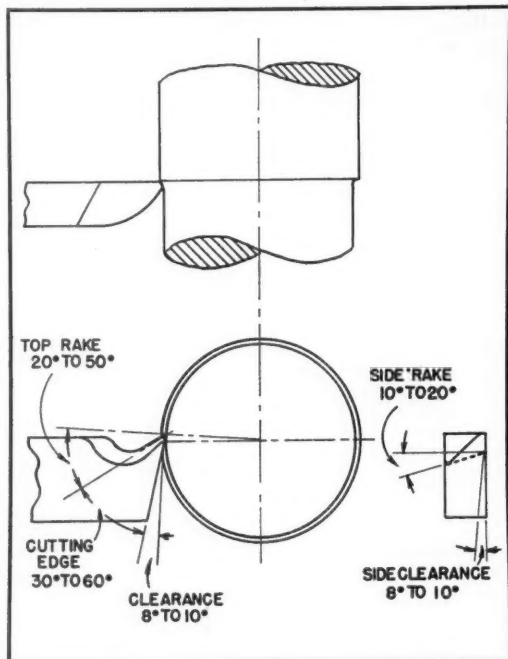


Fig. 1 — Drawing Showing Recommended Rake Angles for Aluminum Cutting Lathe Tools

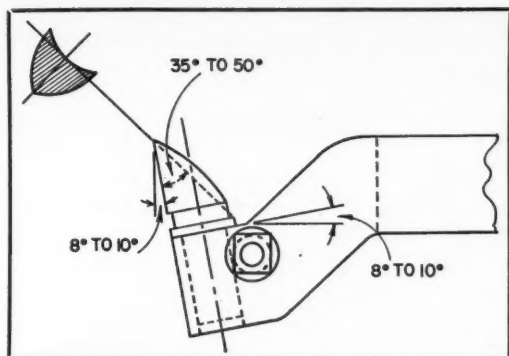


Fig. 2—Drawing of Tool Holder Best Adapted for Machining Aluminum

and remain sharp for long periods of time. For this reason, they are economical for production work. However, they are recommended for operations on which the work is free from vibration and irregularities in the cut.

Figure 1 shows a drawing of the recommended rake angles for aluminum cutting lathe tools. Usually the smaller rake angles are used for roughing cuts and for machining free-cutting alloys, while the tools with the larger rake angles are employed for finishing cuts and for machining non free-cutting alloys. Sometimes tools ground similar to those used for cutting steel can be used successfully.

A large top rake angle is necessary to produce finely finished surfaces, but such a tool must be used in a machine that is free from vibration and has no feeding mechanism lost motion. While some operations may require tools with a small top rake,

too large will cause digging or chattering.

Successful aluminum machining depends to a great extent upon the smooth finish of the tool cutting edge. Tools should be finish ground on a very fine abrasive wheel, then stoned with a very fine oilstone. The cutting edge angles and shapes should be carefully maintained. Cemented carbide tools are preferably diamond lapped.

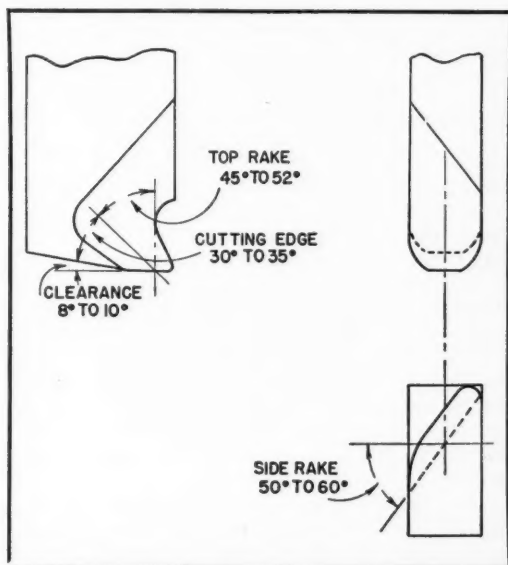


Fig. 3—Drawing Showing Suggested Grinding Angles for Planer or Shaper Roughing Tools

Cuts, Speeds, and Feeds Recommended for Machining Aluminum Alloys

Rough Machining				
LATHE TURNING (See Note)	MAX. CUT INCHES	SPEED (FPM)	FEED, INCHES	NOTES
"	0.19 to 0.25(a)	400 to 900	0.007 to 0.030	(a) Cut measured on radius.
MILLING	0.25	300 to 600(b)	3 to 15(e)	(b) For carbon steel tools.
"	"	500 to 700(c)	"	(c) For high-speed steel tools.
"	"	Max.(d)	"	(d) For cemented carbide tools.
BORING	0.09 to 0.25(a)	600 to Max.(f)	0.007 to 0.020	(e) Travel of work.
"	"	"	"	(f) Peripheral speed of tool is maximum of most machines.
SHAPING	0.25	Max.(g)	0.010 to 0.030	(g) Travel of ram.
PLANING	0.38	Max.(h)	0.025 to 0.100	(h) Speed of table.
Finish Machining				
LATHE TURNING	0.002 to 0.010	600 to Max.	0.002 to 0.010	
MILLING	0.010 to 0.020	500 to 700(b) Max.(d)	4 to 25	
BORING	0.010 to 0.020(a)	600 to Max.(f)	0.001 to 0.005	
SHAPING	0.005 to 0.010	Max.(g)	0.100 to 0.150	
PLANING	0.005 to 0.015	Max.(h)	0.050 to 0.375	

In turning aluminum in a lathe, the point of the cutting tool should be set at or slightly above the center line of the work. Frequently, the same tool may be used for both roughing and finishing cuts, but the cutting edge must be restored before the finishing operation.

The type of tool holder shown in the drawing Fig. 2 is best adapted for machining aluminum. After the high carbon or high speed steel tool bit has been sharpened by grinding, the top surface should be stoned.

The angles shown in Fig. 1 are satisfactory for boring tools, although for small bores the clearance angle should

be increased. Parting tools should have a clearance angle of only 3 or 4 degrees and a top rake angle of from 12 to 20 degrees. A light feed should be employed.

To prevent long cuttings from scratching the surface of finished work, rake angles may be decreased, insofar as is possible with the alloy being machined, in an effort to cause the cuttings to curl tighter, which will have the effect of breaking them as they come from the work.

Lathe center tension must be carefully watched when taking heavy, coarse feed cuts because of the higher rate of expansion of aluminum

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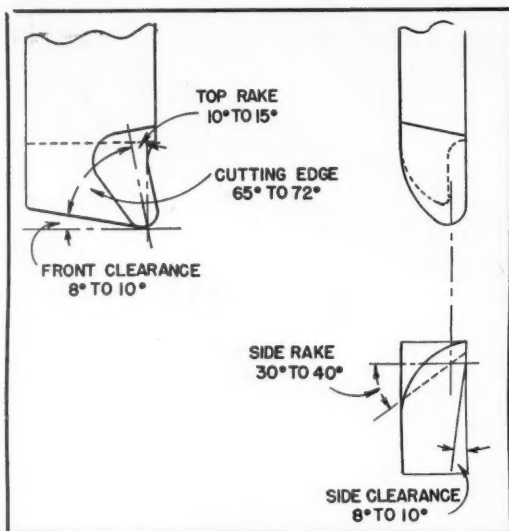


Fig. 4—Drawing of Finishing Tool for Use in Machining Aluminum

when heated. The use of ball or roller bearing tailstock centers will lessen this problem.

Figure 3 shows suggested grinding angles for a planer or shaper roughing tool. Only a moderate amount of rake is recommended for tools of this type.

A finishing tool is shown in Fig. 4. This tool is given a considerable amount of top rake and side rake, so as to produce a free-cutting slicing action. Only light cuts and fine feeds should be taken, and the tool should not be allowed to strike the work on its return stroke.

Milling cutter teeth should be coarse and, where possible, have both top and side rake. Nicked teeth are sometimes helpful since they

break up the cuttings. Fig. 5 A shows an inserted-tooth milling cutter and B a spiral nicked tooth plain milling cutter. The spiral cutter should have coarse teeth undercut to provide a top rake angle of 10 to 20 degrees. The usual spiral angle of 25 degrees provides side rake and an ideal slicing action. Detail C shows an end mill designed for use with aluminum. A helical milling cutter, as shown at D, should have considerable top rake on the cutting edges. Other mill-

ing cutters should follow the same design of tooth rake angles as those given.

Usually it is advantageous to mill aluminum alloys at maximum speed, and with moderate feeds and cuts.

In drilling aluminum, standard type twist drills are moderately satisfactory, but better results can be obtained by using drills having more twist per inch, especially when drilling soft

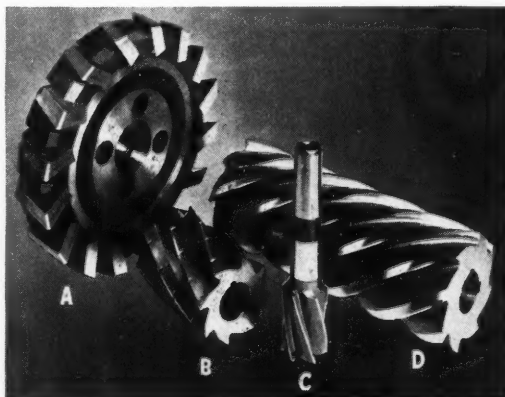


Fig. 5—Illustration Showing Cutters Designed for Milling Aluminum

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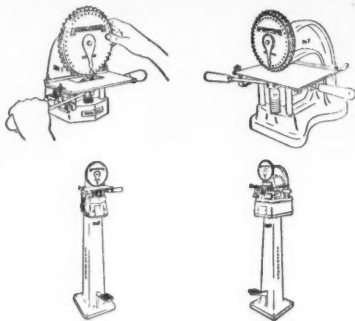
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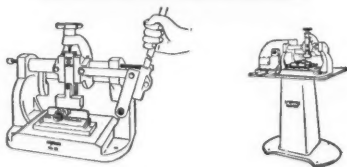
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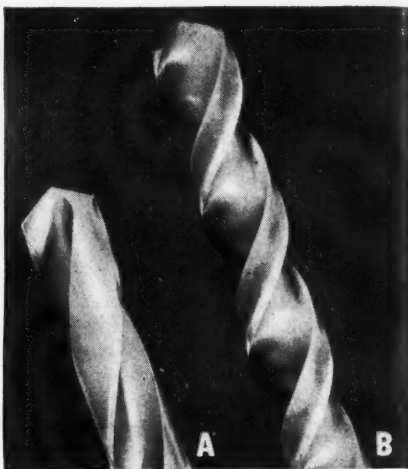
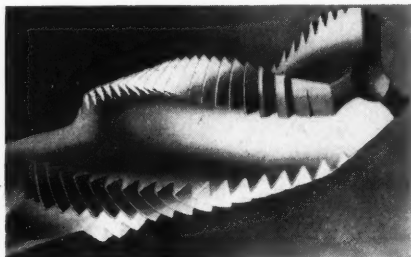


Fig. 6—Twist Drills for Use in Drilling Aluminum

alloys. Fig. 6 at A shows a standard 24-degree spiral drill, and at B a special 47-degree spiral drill for drilling aluminum. This type of drill has more cutting edge "hook" and thus cuts more freely.

Twist drills may be run as fast as 600 peripheral feet per minute. A light feed should be employed when hand feeding. For power feed with high-speed steel drills up to $\frac{3}{8}$ inch diameter, a feed of 0.004 to 0.012 inch per revolution should be used; from $\frac{3}{8}$ to $1\frac{1}{4}$ inch, 0.006 to 0.020 inch; and over

Fig. 7—Illustration Showing Spiral Fluted Taps for Threading Aluminum



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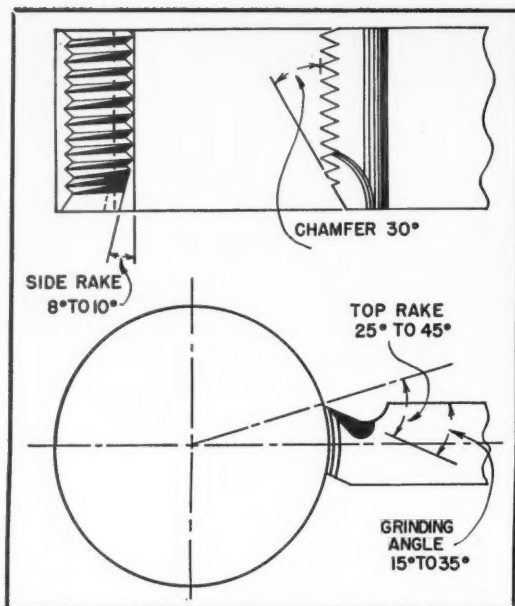


Fig. 8—Illustration Showing Angles for Thread Chasers for Self-Opening Die Heads and Collapsible Taps

should withdraw the drill frequently to dispose of cuttings and to apply compound to the drill point.

For threading aluminum, hand or machine taps of the ground thread type may be used if the flutes are sufficiently wide and deep to provide chip clearance and are undercut to provide "hook" to the leading edges. Spiral-fluted taps, as shown in Fig. 7, are better than straight-fluted taps.

The grinding angles for thread chasers for self-opening die heads and collapsible

1 1/4 inch, 0.016 to 0.035 inch.

For drilling soft alloys or when using a heavy feed, the lip clearance of the drill may be increased. Sometimes it is helpful to thin the drill point by grinding the flutes deeper at the end of the drill. This technique reduces the required feeding pressure and prevents overheating and oversize drilling.

In drilling deep holes, one should use plenty of cutting compound, and

taps are illustrated in Fig. 8. More top rake is needed when threading soft alloys than when threading the harder ones. Lathe threading may be done with a single-point threading tool having the proper thread contour, and the tool should be fed into the work at an angle of 30 degrees. The top and side rake should be in the lower range shown in Fig. 1.

Most types of reamers may be used for aluminum if their cutting edges

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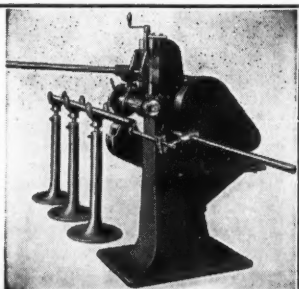
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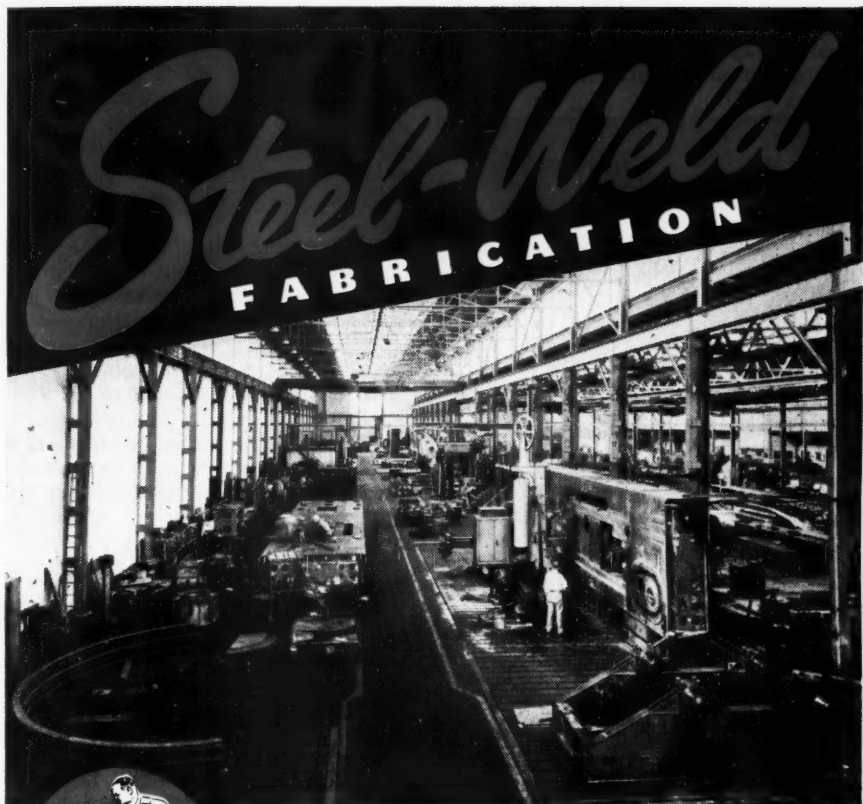
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are finished by honing. Spiral fluted reamers having the spiral opposite to the direction of rotation are preferred.

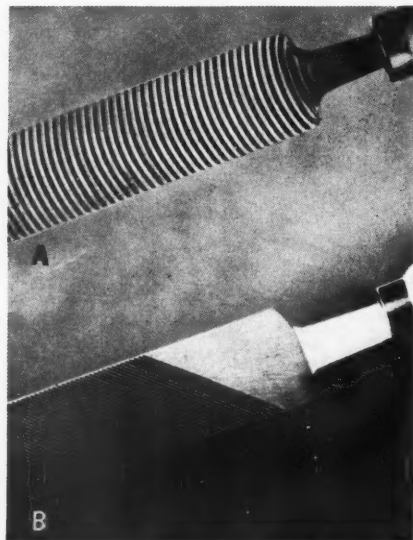


Fig. 9—Illustration Showing Files Which are Designed for Filing Aluminum

able, as they do not feed into the work as rapidly.

Machine reamers less than 2 inches in diameter may be run at cutting speeds up to 400 feet per minute for straight holes or 300 feet for tapered holes. To prevent burnishing, holes to be reamed should be slightly undersize.

The file shown at A in Fig. 9 is ideal for aluminum. It cuts rapidly and produces a smooth surface. The long-angle lathe file shown at B is good for finish filing. Single cut files having coarse or medium-coarse teeth are better if used with oil. The file teeth may be chalked to help prevent loading.

Free-cutting aluminum alloys can be rough machined without a cutting compound unless excessive heat is produced. Soda water or soluble oil is widely used for drilling and milling, sometimes with the addition of a small quantity of kerosene or lard oil.

Where the cutting compound must have lubricating value, equal parts of lard oil and kerosene may be used. For heavy cuts and slow feeds a high viscosity cutting lubricant should be used.

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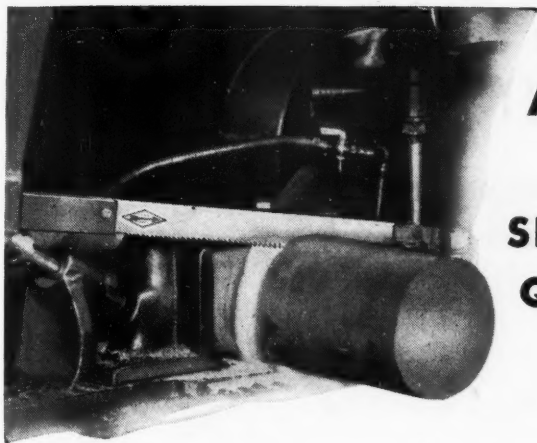


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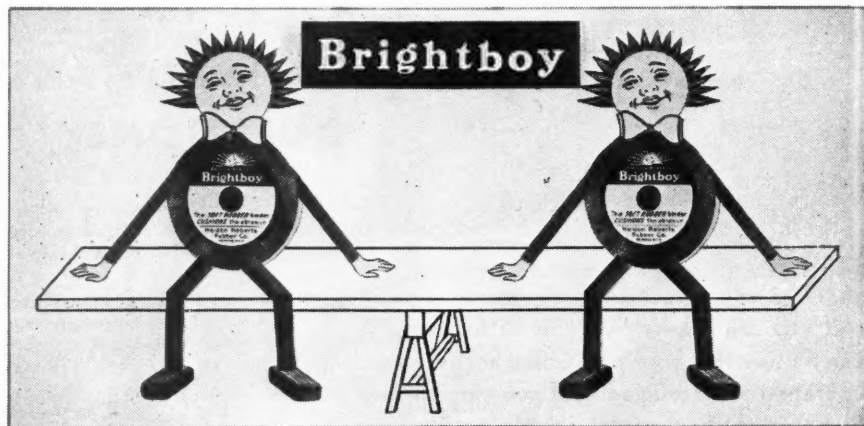
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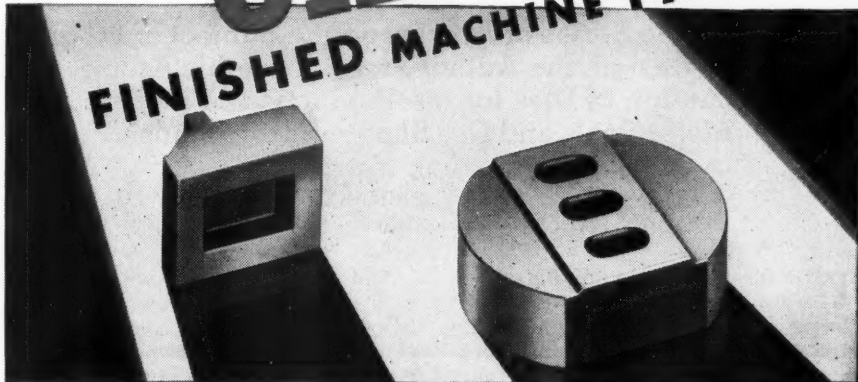


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Progressive Die Design, Part IX

Continuing the Series of Articles on the Subject of Progressive Die Design, the Author Presents, in this Article, a Discussion of Dies for the Production of Electric Meter Seals and Dry Shaver Razor Heads.

By C. W. HINMAN
Designing Engineer

THE dies presented in this article were selected for discussion for the reason that each exemplifies the high rate of production that may be obtained on parts which, by their very nature, are fragile.

The illustration Fig. 23 is a photograph of the scrap strip from which metal seals for electric meters are made. The work material is 0.017 inch gauge sheet aluminum alloy. The progressive die with which this strip is produced is shown in Fig. 24, and examination of the illustration will show that the die is designed to produce two seals with each down-stroke of the press-ram.

The die is equipped with a finger stop against which the end of the strip is entered when the finger is depressed, the stop being shown at the right front of the die. Two automatic stops and a "bumper block," are provided, the bumper block being positioned at the rear of the die shoe. The location of the bumper block ensures that the punch holder will come into contact with it on the downstroke, thus preventing embossing and stamping the work too severely. It also prevents contact between delicate punches and the dies when the tool is stored, and will be found a great help in determining the closed tool height when

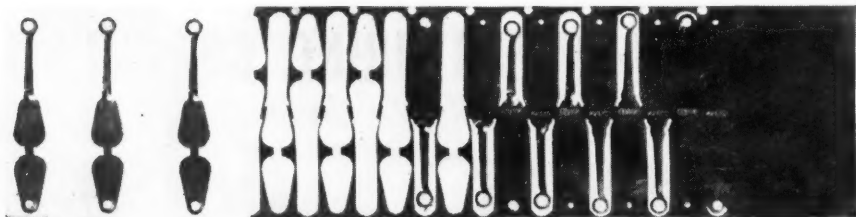
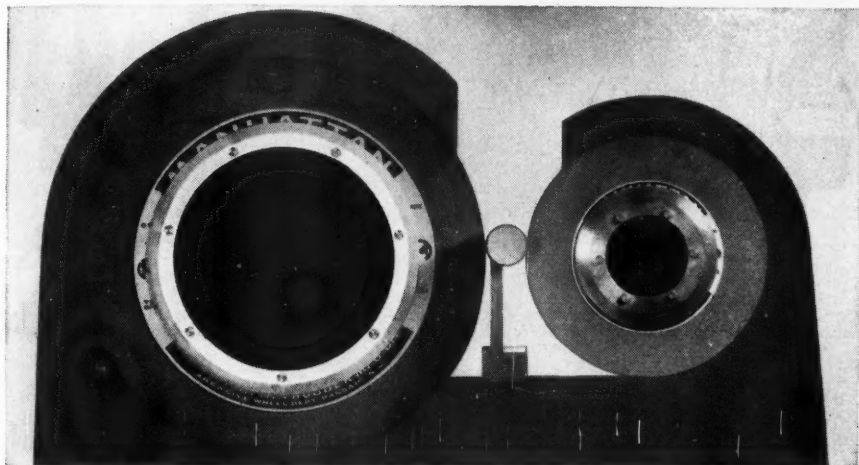
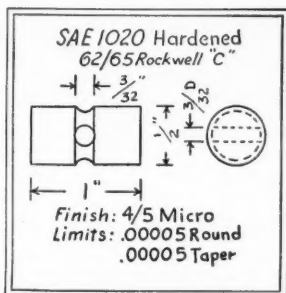


Fig. 23—Scrap strip and the cut blanks for electric meter seals are produced progressively, at a rate of two blanks per press stroke.

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Rough soft—2 passes .005/.006 each—hold tolerance to .0002
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Pins hardened at this point to 62/65 Rockwell "C"
Finishing hardened—Filmatic Bearing Machine—wheel speed
1600 RPM
3 passes .001/pass for sizing and rounding up
Final pass .0015—3 to 4 micro finish—hold tolerance—
.000025

Example #2: Roughing and Finishing Miscellaneous Materials

Performance of 20x6x12—80100 Q52 BV5 Wheels at
1200 RPM. On all these jobs wheels held good size
with infrequent dressings:
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3 passes—.008, .004 and .001 to 4 or 5 micro finish
1/2" dia. x 5/8" long Hardened Steel Bushing
Infeed—.008 removal—very good finish and size
1/4" dia. x 8" long—Stainless Steel Bars
2 passes—.010/.012 and .002/.003 to excellent finish



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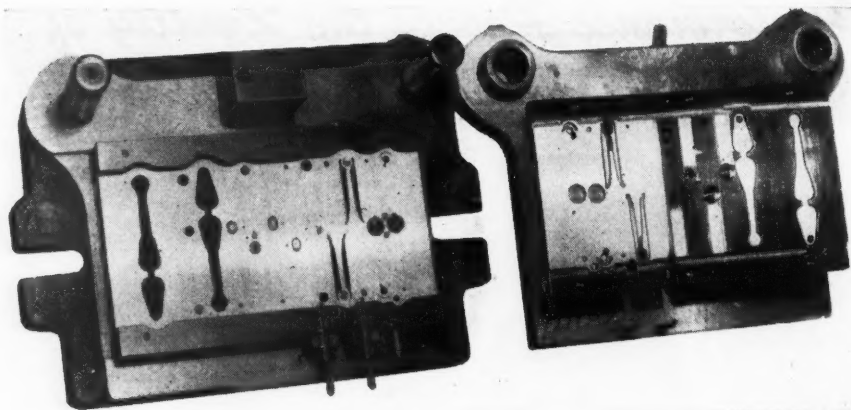


Fig. 24—At left is shown a progressive die built of steel sections. At right, the face of the punch holder, showing the punch bodies surrounded by the stripper plate. This die produces the work shown in the preceding illustration.

making an initial set-up.

In the illustration of the punch holder face, at the right, a spring stripper plate can be seen; this plate surrounds the punches, the punches being anchored in a punch plate behind the stripper. The holes in the stripper plate are made to a sliding fit for the punches.

By comparing each station in the scrap strip with its corresponding station in the die, it will be seen that the operations are consecutive in the following order: (1) Emboss and trim ends, pierce pilot holes and stamp lettering. (2) Trim sides of blank. (3)

Start embossing at center of blank. (Note that ends of seals draw in; punches are hinged to permit this action. (4) Finish embossing and extrude holes. (5) Cut blanks through the die.

Using a double roll feed, this die runs continuously when put into operation. The lubricant used consists of a mixture in the ratio of one pint of kerosene to one tablespoon of oil. The die was designed to meet high production requirements; 50,000 parts are produced in eight hours. The necessity for two automatic stops arises from the fact that the work material is very



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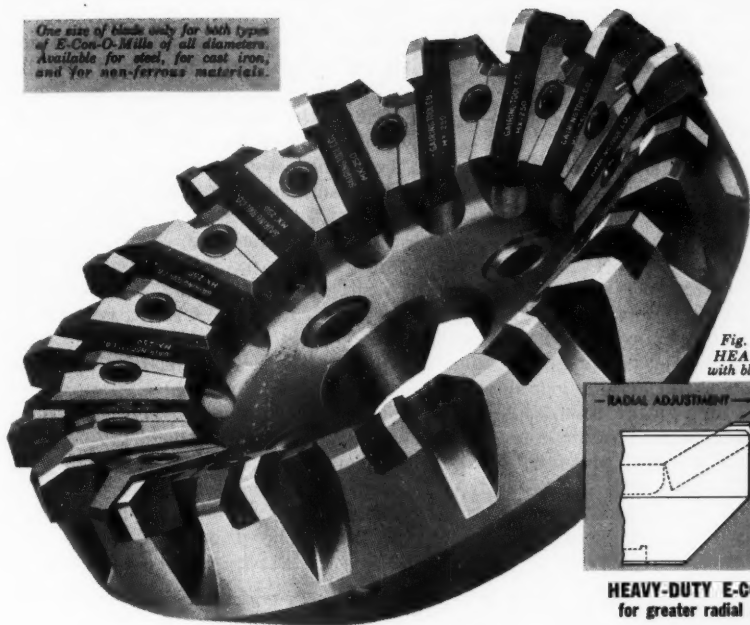
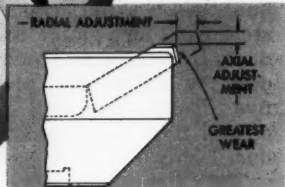


Fig. 1—10-inch
HEAVY-DUTY
with blades for cast iron



HEAVY-DUTY E-CON-O-MILL
for greater radial adjustment

Now... the Gairing **HEAVY-DUTY** **E-CON-O-MILL**

PATENT APPLIED FOR

IN SIZES
8-IN. DIA
AND OVER

This new standard face mill is offered for heavy roughing operations where the blades suffer more wear along the periphery than across the face of the cutter. It offers all the economies of the regular E-CON-O-MILL plus longer blade life while roughing.

The same blades and locks are used in both the heavy-duty and the regular cone-type bodies of all sizes, a further reduction in tool inventory.

These are the same blades that come finish ground, ready for work, and which may be replaced and re-sharpened without removing the cutter from the spindle; the same locks which remain entirely attached to the body when changing blades.

For a heavy-duty face mill at its best, call your GAIRING representative or write to us.

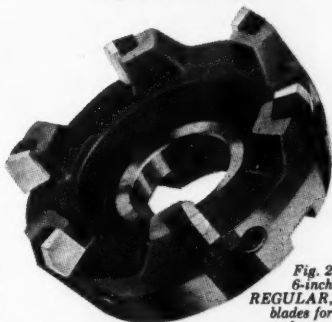
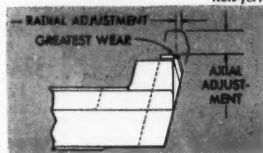


Fig. 2
6-inch
REGULAR,
blades for
non-ferrous



REGULAR E-CON-O-MILL
for greater axial adjustment

THE GAIRING TOOL COMPANY

P.O. BOX 478, ROOSEVELT PARK ANNEX, DETROIT 32, MICHIGAN

fragile. It was found that when only one stop was used, the stress due to feed pressure would cause the strip to tear; by using two stops the trouble was eliminated.

Producing Dry Shaver Heads Progressively

In the illustration of the die for producing dry shaver razor heads, Fig. 25, the die is shown above and the punch holder below. A short length of scrap strip can be seen in front of the punch holder. This tool is another good example of the economy obtained by the use of well-designed and precision-built dies. The material is crucible tool steel, 0.014 inch gauge, and the die produces about 30,000 razor heads per day. By the method previously used, five operators, using five hand-fed dies in five conventional presses, produced only 8,000 heads per day.

The progressive die used on this

job is of delicate construction, and requires expert diemaking and close attention when in operation. Referring to the scrap strip, attention is called to the line of pilot holes positioned close to the outside edges of the strip. Pilot punches at seven stations enter these holes ahead of the cutting tools, thus maintaining alignment of the strip and work with the dies.

The die has nine consecutive stations. Eight auxiliary liner pins in the punch holder enter corresponding holes in the die blocks to further ensure perfect alignment of the punches with the dies. The order of operation is: (1) pierce the holes at the progressive stations, and (2) cut the blank through the die in the last station at the left. Twenty short "bumper pins" in the punch holder register on the die blocks to establish the proper closed height of the press tool.

The die set is all steel, and the die

Libert **Hi-Speed** SHEAR

CIRCLE CUTTING ATTACHMENT
Included as
STANDARD EQUIPMENT
with this Machine



MODEL 1236
36-in. throat.
12-gauge capacity.

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LIBERT MACHINE COMPANY
Green Bay, Wisconsin

SIMPLIFIES Maintenance SPEEDS Production SAVES Manpower

The *Libert* has amply proved its advantages by turning out top production—shearing flat or formed sheet metal, internal or external, plain or irregular shapes *rapidly, accurately, cleanly!*

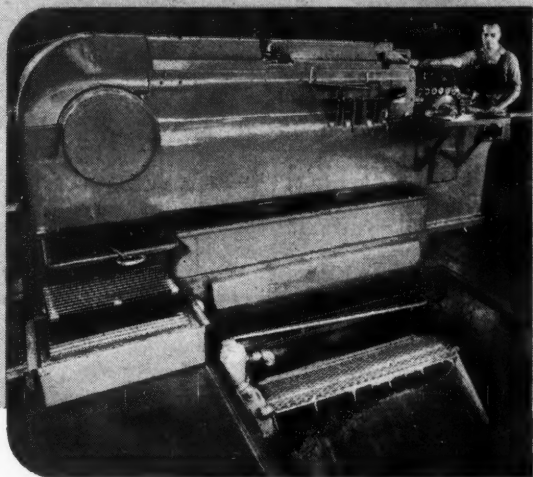
Equally effective in maintenance work, *Libert* is cutting costs to rock bottom. Edges are smooth, need no finishing. Unskilled operators produce accurate work at once.

Sizes up to 60-in. throat, 10-gauge capacity.

Eliminate STICKY FIXTURES

WITH
BARNESDRIL
Automatic
**COOLANT
SEPARATOR**

Example:
Foots-Burt Broaching Machine



★ Timken Roller Bearing
Company surface broach
Rock Bits for the mining

and contracting industries at their Colorado Springs plant. Fine sludge and chips accumulating from this operation foul the coolant and collect in the fixtures, causing them to stick and jam. These fixtures are precision-designed with gears, sleeves, and other intricate parts, and the problem of periodic maintenance, along with shutting down the machine has been a serious cost problem.

BARNESDRIL engineers working closely with plant production officials, installed a No. 10 **BARNESDRIL** Coolant Separator on this job which automatically removed all particles from the coolant. As a result, this difficult fixture problem and a disagreeable job of cleaning sludge and sediment from the reservoir have been eliminated. Direct savings in cost have paid for the separator several times.

Why not check the application of **BARNESDRIL** Separators on your grinding, honing, shaving, shaping and broaching operations for similar savings and efficiency.

Send for Bulletin B151E

BARNES DRILL CO.

860 CHESTNUT STREET ROCKFORD, ILLINOIS U.S.A.

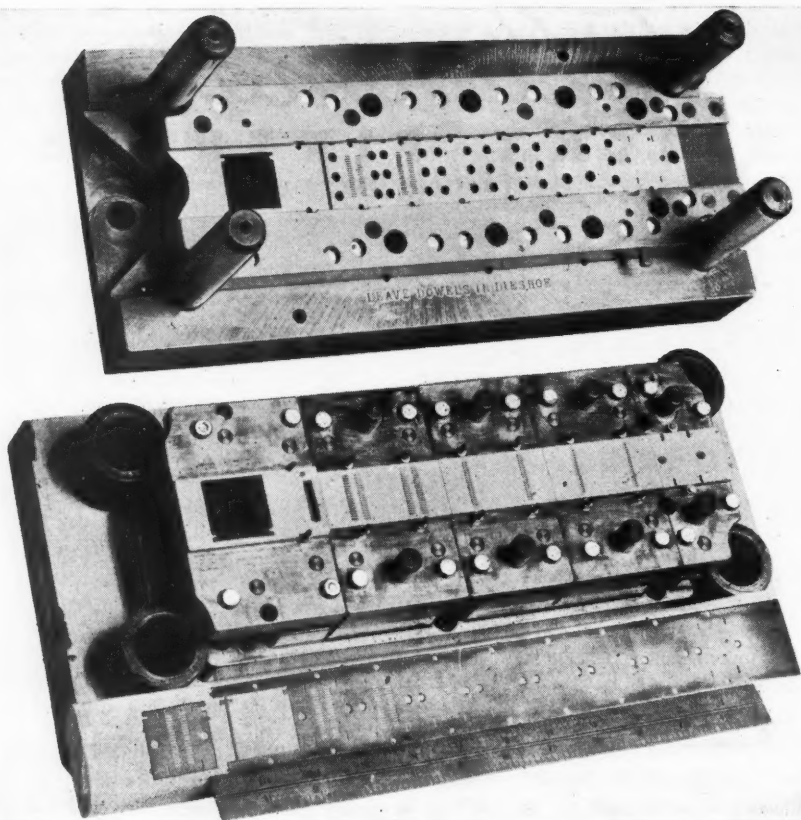


Fig. 25—This illustration shows, at top, a four-post progressive die built in five sections; at bottom, the face of the punch holder in which the punches are surrounded by five stripper plates. This die produces dry shaver heads. The scrap strip and blank are shown in the foreground.

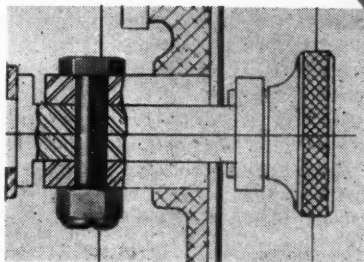
shoe is equipped with four substantial guide posts that enter phosphor bronze guide bushings in the punch holder. The strip is fed by an automatic double roll feed positioned at the right of the die, feeding from right to left. The depressing of one finger stop halts the entering end of the strip at the correct point over the first station. From there on, the center distance between the stations is determined by the entrance of the pilot

punches. The strip is guided on both sides by guide strips secured to the edges of the dies.

This die is of sectional design, having five sections and five stripper plates, the latter surrounding the punch bodies within close sliding fits. All the punch plates, strippers, and die sections are finish-ground to precision tolerances.

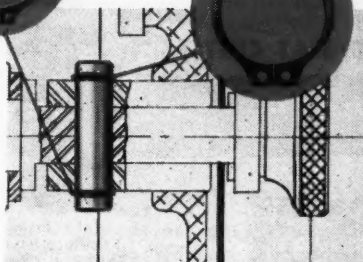
The die has 160 slots, 80 of which are 0.015 by 0.125 inch and 80, 0.015

Truarc saves 5 minutes, 9 cents in materials per unit without re-design of electric sanders



OLD WAY

Special $\frac{1}{4}$ " cap screw and $\frac{1}{4}$ -28 fibre-insert nut holds idler arm and pulley assembly on Model A3 "Take-About" Sander, Porter-Cable Machine Company.



NEW WAY

Simple $\frac{1}{4}$ " C.R. shaft, grooved in automatic screw machine, equipped with Waldes Truarc Retaining Rings. Bowed external ring (#5101-25) at top exerts resilient pressure taken up by Standard external ring (#5100-25) at bottom. Assembly is secure against vibration, can be easily taken apart and re-installed many times with same Truarc rings.

Every sander through the production lines costs 9 cents less for materials, requires 5 minutes less labor—with just the simple change from cap screw and nut to Waldes Truarc rings by Porter-Cable Machine Company, Syracuse, New York. The change to Truarc required no new design, no alterations in castings, but just the reappraisal of old methods.

Truarc can help you cut costs and increase produc-

tion, too. Wherever you use machined shoulders, nuts, bolts, snap rings, cotter pins—there's a Truarc ring that does a better job of holding parts together. All Waldes Truarc Retaining Rings are precision engineered, remain always circular to give a never-failing grip.

Send us your drawings. Waldes Truarc engineers will be glad to show how Truarc can help you.

See us at the Power Show, Grand Central Palace, N. Y., November 29-December 4, Booths 522-523



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TRUARC**

REG. U. S. PAT. OFF.

RETAINING RINGS

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WALDES TRUARC RETAINING RINGS ARE PROTECTED BY U. S. PATS. 2,501,949; 2,026,654; 2,515,882 AND OTHER PATS. PEND.



Waldes Kohnoor, Inc. 47-10 Austin Place MM-11
Long Island City 1, N. Y.

Please send 28-page Data Book on Waldes Truarc Retaining Rings.

Name

Title

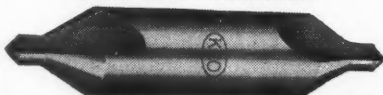
Company

Business Address

City Zone State

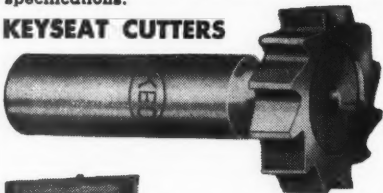
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CENTER DRILLS



Made of finest high speed steel. Available in all standard sizes. Always in stock for immediate delivery. Specials made to your specifications.

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High speed. Right hand. $\frac{1}{4}$ " shank. Diameters from $\frac{1}{4}$ " to $1\frac{1}{2}$ ". Standard sizes in stock for immediate delivery. Complete set—41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size you need.

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High speed steel. Reamers from $\frac{1}{4}$ " to 1" regularly furnished with 60°, 82° or 90° included angle. Specials made to your specifications.

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Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from $\frac{3}{16}$ " to 1" are .0005" undersize at small end, from $1\frac{1}{16}$ " to 3", .001" undersize. Immediate delivery.

Write for Literature

Illustrated literature and prices on all KEO Products mailed on request

KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

by 0.034. These figures indicate the almost unbelievable amount of precision work and patience necessary for the successful completion of such a high grade die. Blanks are pushed through the die in the last station and fall into a chute which leads to a container.

This job is run on a Henry & Wright 50-ton dieing machine at 75 press strokes a minute, one finished piece being delivered at each stroke. Approximately 25,000 parts can be produced before it becomes necessary to recondition the punches and dies by light regrinding.

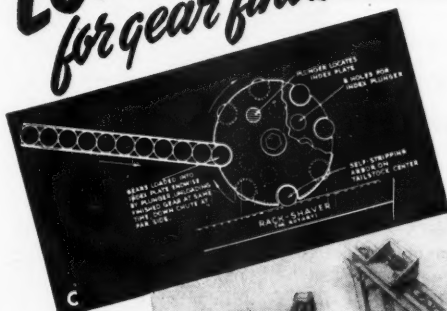
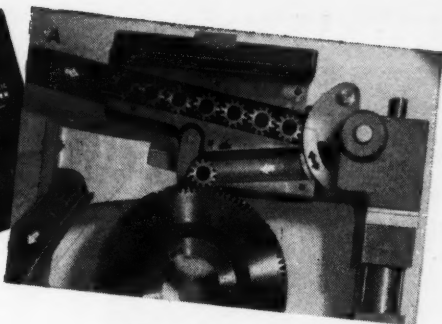
Both of the dies described in this article were designed and built by the Moore Special Tool Company, Bridgeport, Connecticut, and the photographs were supplied by this same company.

"TWO ON A HANDCAR"



—Justus in Minneapolis Star.

AUTOMATIC LOADERS *for gear finishing*

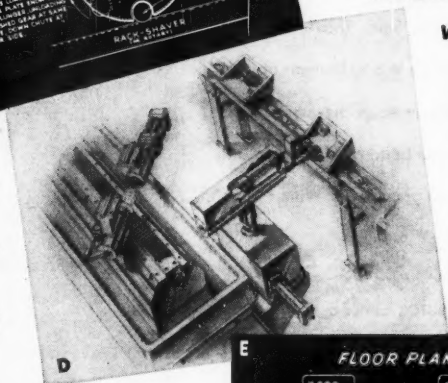


A.
Gravity feed No. 1 for
rotary finishers.

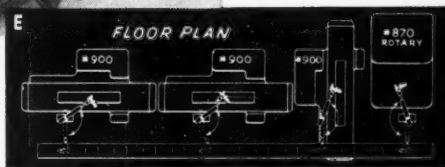
B.
Gravity feed No. 2 for
rotary finishers.

C.
Indexing feed mechanisms
for pinions, used on rack
or rotary machines.

D.
Jaw type, for large
gears or clusters on rack
or rotaries.



E.
Using 4 automatic loaders
to completely finish 70
cluster gears per hour
without manual handling.



WHAT THEY WILL DO:

1. Eliminate manual handling of individual gears IN and OUT of machines.
2. Boost production *automatically* to as many as 300 gears per hour per machine. (Fig. A, B or C.)
3. Cut machine idle time to 2 secs. or less per gear.
4. Enable finishing of cluster gears without any manual handling between machines. (Figs. D and E.)
5. Eliminate mounting gears on arbors.

WHERE YOU CAN USE THEM:

On either rack or rotary machines,
whether new or already installed.

WHAT TYPE TO USE:

There is no one best type.
Shown here are several. (**).
We will be glad to recom-
mend the best type for your
production requirements.

***For complete description of these
devices ask for Gear Highlights,
Vol. 12, No. 1*

MICHIGAN TOOL COMPANY
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WINTER BROTHERS TAPS ARE DEPENDABLE

COORDINATED RESEARCH



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Winter Chip Driver Taps are designed for fast operation in tough alloys. They are part of Winter's complete line of carbon and high speed steel taps and dies.

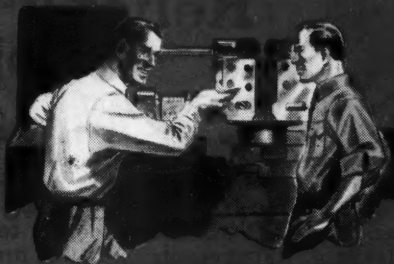
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A. G. Bryant

European Recovery vs. Relief

By A. G. BRYANT

President, National Machine Tool Builders' Association
President, Bryant Machinery and Engineering Company
Vice President, Cleereman Machine Tool Company

THE end of World War II found the Western European countries in a debilitated state. A large part of their physical facilities had been destroyed in the course of the war or had been removed by the Germans. There were severe shortages of food, fuel, consumers goods and raw materials. The spirit of the people was broken—resignation and lack of determination characterized the psychological state of large segments of the populations.

It was very clear that these countries would have to have assistance in rebuilding themselves. The European Recovery Program was designed for this purpose. Sixteen nations were to receive dollars with which they could purchase what was necessary.

In the early days of peace this money was largely used to purchase relief supplies. No one familiar with the conditions in Europe could question the urgency for providing food, fuel

and other commodities to the devastated countries. It was first necessary to overcome privations so that the people of Western Europe might aid in their own recovery.

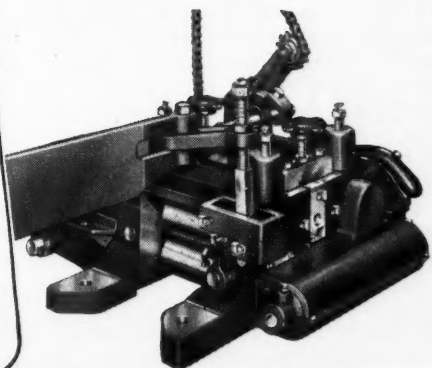
A. G. Bryant, President of the National Machine Tool Builders' Association, has recently returned from a trip to Europe in which he visited practically all of the countries that today are concerned with the outcome of the United Nations Conference. His report, therefore, as to the disposition of ECA funds is particularly significant.

Recovery is the basic purpose of the program, however; and there is danger that continued emphasis on relief may thwart realization of the intended result. Continued outpouring of commodities serves no final purpose in correcting maladjustments abroad and

can weaken our own economy. The great need of Europe is for the production of goods.

Food continues to be a big problem. Even though harvests this fall were large, since former sources are now unavailable, food supplies are far below demands. Mechanization of agriculture can do much to correct this situation. Our own Department of Agriculture declares that fifty per cent of our increased agricultural pro-

**Assures Fast
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Feeding of
Coiled Strip Stock**

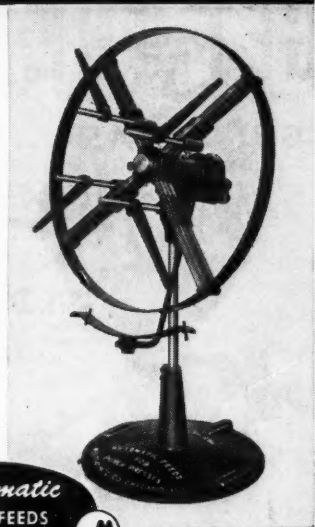


WITTEK *Automatic* **ROLL FEEDS AND REEL STANDS**

For All Types of Punch Presses

Wittek *Automatic* Roll Feeds provide maximum efficiency in the high speed automatic feeding of all types of coiled strip stock to punch presses. Highly flexible in function and application, they are capable of feeding lengths up to 24" per stroke of the press and will handle various stock thicknesses in widths up to the maximum width of the rollers.

Wittek *Adjustable* Reel Stands provide automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and back lash of stock. If your production problem involves feeding coiled stock to punch presses, consult us. Your inquiry will be given immediate attention. Ask for completely descriptive catalog.



WITTEK Manufacturing Co.

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Automatic
ROLL FEEDS
and
REEL STANDS



duction during the period between the two wars came about because land formerly tilled to supply food for horses and mules was released through mechanization so that the land could grow food for human consumption. Stimulation of production of tractors and other farm machinery in Europe will have important effects on food supplies.

Similarly, stimulation of production of equipment for steel fabrication, for the production of mining machinery and countless other items is necessary in order that the nations may supply the largest possible share of their requirements and regain economic stability before the outpouring of commodities from America saps our own resources to a critical degree.

Adequate production can only be obtained by the use of such facilities as machine tools. Continued delays in the shipment of production machinery,

therefore, are slowing the progress toward real recovery.

Why are the obvious necessities being sidetracked in favor of relief supplies, which contribute practically nothing toward sound economic recovery?

Our recovery organization, mindful of the American tradition that we do not dictate policies to foreign governments, has been extremely hesitant in suggesting to European governments how they should use their ECA dollars. Thus, control over the manner in which the money is spent rests not with any agency in the United States, but with local national authorities in each country, set up for this purpose.

As a result, a European manufacturer who wants exactly the right machine tool to do the job in the best possible way, and who knows that an American-built machine tool is the only answer, finds that he is unable to

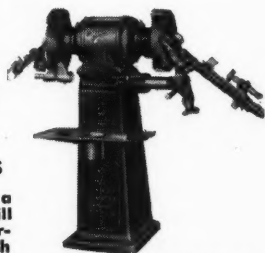
GET THE POINT?

GET IT FAST...GET IT RIGHT

with **Hisey** Drill Grinders



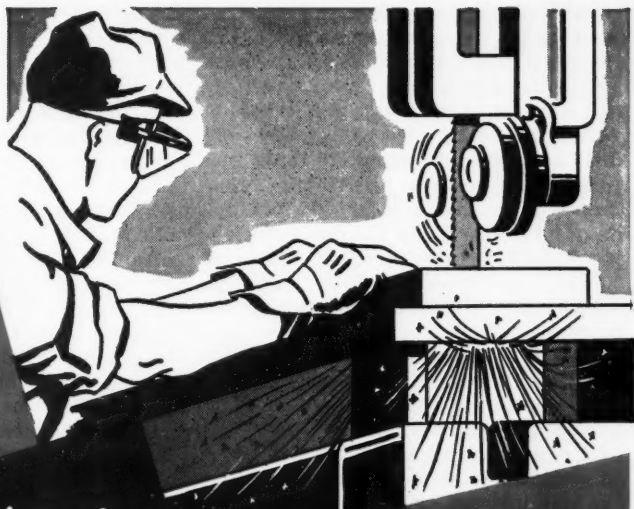
Heavy Duty Wet Drill Grinder—providing constant stream of coolant for grinding large drills.



Heavy Duty Drill Grinder—a compact unit for tool room or shop.

The importance of a correctly - ground drill point cannot be over-emphasized. With "Hisey" Heavy Duty Drill Grinders, even unskilled workers get a perfect point every time, in minimum time. From No. 60 to 2½" drills on one machine without clamping or chucking. Drills up to ¾" are ground on the left hand wheel . . . 59° angle at point and 12° clearance angle without adjustment. The larger holder grinds points varying from 37° to 70°, with clearance angle as required. And these Hisey-ground perfect points mean your drills last longer, drill more holes per grind with far less breakage and drill holes true to size. Write for Catalog 70 AV, showing many other styles and sizes.

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DIVISION OF SMITH & MILLS CO.
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Metal Cutting
Band Saw Blades

Lenox has perfected an outstanding saw for this purpose. Friction cutting with metal band saw blades traveling at tremendously high speeds is ordinarily a melting-burning procedure as distinguished from the conventional slower speed sawing operations.

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WITH METAL CUTTING BAND SAW BLADES, WRITE

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AMERICAN SAW & MFG. CO.
SPRINGFIELD 1, MASSACHUSETTS

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Band Saws

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buy the machine unless the government of his own country approves it.

Subject to the pressures with which politicians are always confronted, it is inevitable that foreign government units should be forced to pay most of their attention to immediate relief requirements, rather than take the chance of losing popular support by insisting that some of the demands for supplies be curtailed in order that production facilities might be included within the allotments of available funds.

America gets no credit for its bashfulness in failing to insist on a sounder appropriation of funds. Government officials of the various countries, as well as private businessmen, expressed great surprise to me that America has not insisted that the nations receiving the aid accept proper apportionment of recovery facilities.

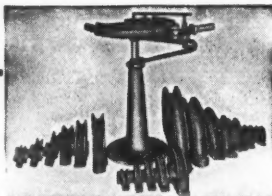
We should require, when necessary, that the countries being helped should

also accept our guidance in the allocation of funds. To advance aid without a corresponding degree of control is inefficient and unwise.

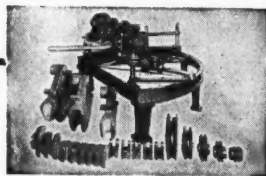
A misconception is prevalent in Europe concerning American mass production. In Europe it is taken for granted that everything in America is produced in great quantities and that productive machine tools are only suitable for large volume manufacturing. Actually, of course, the great majority of American manufacturers are engaged in the production of items that are not needed in enormous quantities. Even for small quantity production the machine tool is essential. The genius of America's success in manufacturing lies not so much in the idea of "mass production" as it does in the principle of "interchangeability of parts" which is being applied so generally in this country to relatively "small lot" production as well as to mass production.



**BY HAND or MOTOR
MACHINES TO BEND COLD PIPE, CONDUIT, BOILER TUBING
AND SOLID BAR . . . BENDING TABLES ALSO AVAILABLE**



Above: Hand-powered Type A-30 . . . up to 180° bends . . . all sizes from 1/2" to 2". Only 7 parts. World's fastest, simplest machine. Note assortment of bending dies . . . this process makes shorter tangents than any other. Occupies only 18" x 18" floor space!



Above: Motor-powered Type E . . . bends fixed radii of 6 to 1 up to 90°. Type E bends 2 1/2", 3", 3 1/2" and 4" pipe. 3 horse-power motor. Floor space occupied—7' 6" x 7' 6". Other power machines up to 8" capacity.

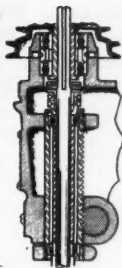
Other Sizes Available

**Factory and Main Office: 14 Furnace St.,
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**"American"
PIPE BENDING MACHINE
Company, INC.**

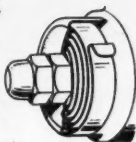
FOUR PRECISION BALL BEARINGS

Two on spindle, two on drive sleeve. Pre-lubricated and sealed precision type, no oiling required.



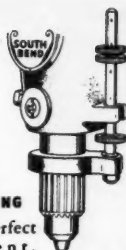
ADJUSTABLE QUILL RETURN SPRING

Retracts quill instantly upon release of feed lever. Tension of spring adjustable.



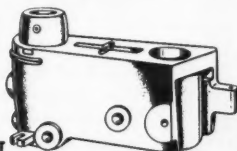
DEPTH GAUGE

Controls feed depth, length of return stroke, or locks spindle in any position. 16th graduations.



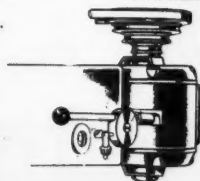
ONE-PIECE HEAD CASTING

Insures perfect alignment. Double-plug binder locks the head to column. Column bearing is NOT split.



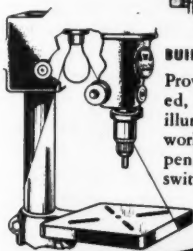
BELT TENSION RELEASE

Flip of lever removes tension from belt for easy speed changes. Proper belt tension maintained.



BUILT-IN LIGHT

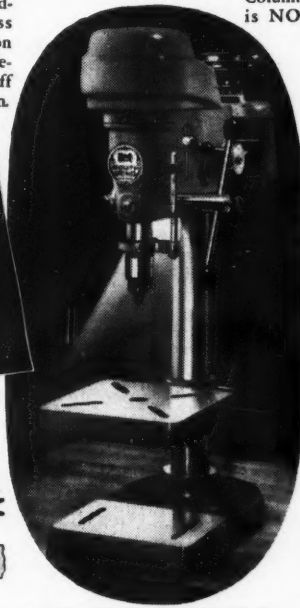
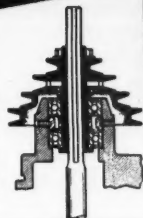
Provides shielded, shadowless illumination on work area. Independent on-off switch is built-in.



NEW!
SOUTH BEND
14" Drill Press

FREE-FLOATING SPINDLE

Design prevents misalignment, side thrust and whip. Precision splines in spindle and sleeve.



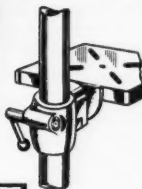
QUILL BEARING ADJUSTMENT

Shoe-type take-up provides feather-touch tension and secure locking. Quill bearing is NOT split.



TABLE LOCK

Double-plug binder securely locks table to column. Eliminates misalignment. Column bearing is NOT split.



CAPACITIES — SPECIFICATIONS

CAPACITY
Maximum drill size in iron or steel— $\frac{1}{2}$ "
Drills to center of 14 $\frac{1}{2}$ " circle.

CHUCK
Capacity—0 to $\frac{1}{4}$ "

SPINDLE
Regular drill chuck type supplied.
Travel.....4"

CHUCK TO BASE DISTANCE
Bench Model—17"
Floor Model—46 $\frac{1}{2}$ "

SPINDLE SPEEDS
Four—655 to 4530 r. p. m.

TABLE SIZE
10" x 10". Tilts to any angle.

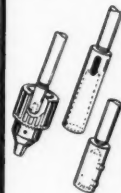
Bench Model \$129³⁰

Floor Model \$144³⁰

Prices, f.o.b. factory, include drill chuck and 1/3 h. p., 115 or 230 v., 1 ph., 60 cycle motor and switch.

INTERCHANGEABLE SPINDLES

Spindles available to take No. 2 Morse taper shank tools, and for 1/2" straight shank tools, router bits, shaper cutters, etc.



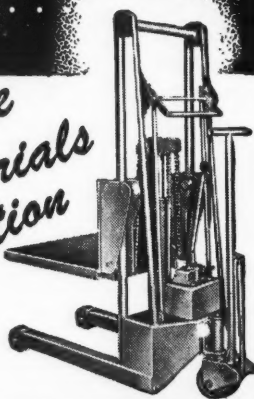
SOUTH BEND LATHE WORKS

BUILDING BETTER TOOLS SINCE 1906 • 427 E. MADISON ST., SOUTH BEND 22, IND.



Here is an *Improved*
Way to . . .

*Handle
Materials
and Position
Work*



LYON-Raymond Hydraulic HIGH-LIFT TRUCK

Modern welded tube and formed plate construction, designed for strength, rigidity and safety. Weighs only half as much as an ordinary tiering truck of comparable capacity.

1. LIFTS AND TRANSPORTS

Will pick up a skid load as handily as the usual type of lift truck. Easily transports capacity loads and can be steered into any space accommodating its width.

2. SUPPORTS

An adjustable support for overhanging work on drill presses, shears, cut-off machines, punch presses, etc. Serves also as a feed table for many operations. Secure floor lock.

3. LEVELS

Exact leveling for changing dies in presses. Ideal for transporting heavy die sets, fixtures and tools to and from storage bins.

4. POSITIONS

Adaptable to positioning work in lathes, loading and unloading heavy work from other machine tools. Quicker and safer than with a helper and chain hoist.

5. LOADS AND UNLOADS

One man can do the work of many in loading and unloading freight. Especially convenient where shipments are delivered to curb or where docks are not available. Hydraulic operation assures ease and safety.

6. TIERS

An easily maneuvered truck, adaptable to tiering. Among other uses it serves as an adjustable work table for machining, assembly and general toolroom work.

Write for
BULLETIN 240
Exhibiting at
National Materials
Handling Show
Philadelphia

**LYON-Raymond
Corporation**

742 Madison St., Greene, N. Y.

The small shop in Europe, as in America, must employ the most efficient machine tools if it is to survive in a competitive struggle. Therefore, the installation of the latest models of machines cannot be restricted in Europe to the automobile plants or to other producers on a relatively large volume scale. General industry among the participating nations must grasp the opportunity to utilize the finest machinery available in order to accomplish the goals of recovery for their countries and survival for themselves.

The efficient use of present readily available American machine tools would enable Britain and the Continent to more quickly manufacture the products that are desperately needed and this, in turn, would enable business in the participating nations to turn out goods at a cost, and therefore at a price, that would enable them to compete in world markets.

Let's grant the urgency of immediate relief. But the key to the solution of most of the political and financial problems of Europe lies in enabling the people of Europe to produce better things for more people at a lower cost.

The time is late. Much has been lost in the recovery schedule by failure at an earlier date to provide such facilities. The ECA is a great concept and under Paul Hoffman's leadership it has already made a notable contribution.


It is imperative that government leaders, here and abroad, recognize that enduring progress can be made only if and when we provide the people of Europe with the tools they need to produce their way into survival and prosperity.

I am confident that ECA's progress will be accelerated by a growing recognition by all concerned that maximum productivity is the only sure foundation for sound economic recovery.



When you're glad
you have a
Snap-on

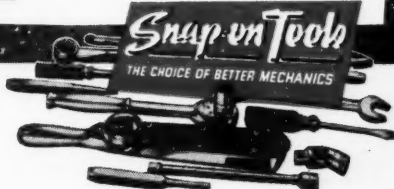
Snap-on
Tools
for faster
"set-up" time!

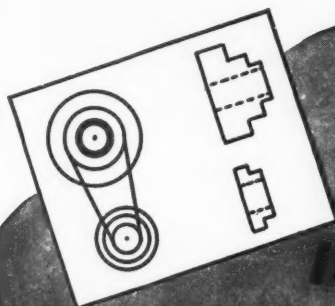


HERE is a typical example of why machine setters and operators throughout industry prefer Snap-on tools. This operator makes a faster, safer adjustment with a 15-degree angle Boxocket that provides ample clearance for unhindered nut-turning. The Boxocket completely encircles the nut and grips securely on all six corners . . . eliminating danger of slipping and possible injury to operator. This is only one of more than 4,000 tools in the complete Snap-on line . . . carefully engineered for maximum efficiency, extreme durability.

Precision-built Snap-on tools are available in complete sets and in a full range of sizes through more than 40 strategically located factory branches. Write for address of the Snap-on factory branch nearest you.

SNAP-ON TOOLS CORPORATION
8032-K 28th Avenue
Kenosha, Wisconsin





IDEAS FROM READERS

Lathe Tool Post Insures Accurate Height Setting

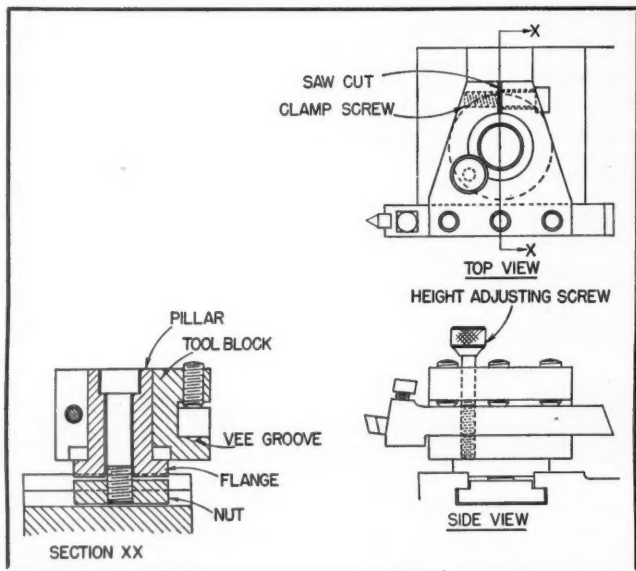
By CLIFFORD T. BOWER

WHEN accurate screw threads are to be cut on the lathe, the cutting tool should be set on the dead center of the lathe axis, and correctly placed so that an accurate Vee form

is generated on the work. It is difficult to achieve accurate tool setting with the usual form of tool post since the placing of the tool point in two planes is dependent upon the stability of the boat-shaped packing piece used.

The tool post shown in the drawing herewith was made so that the tool point height could be accurately set with a screw adjustment and the tool

swivelled without upsetting this adjustment. The tool post also permits working close up to the chuck without the use of cranked holders. It will readily hold boring bars with circular or square shanks, eliminating packing strips of any kind. Tipped tools with solid shanks or forged tools



Specially Designed
Lathe Tool Post

Get EASIER, FASTER, METAL MARKING



With one easy operation of the Pannier Supreme Holder, you can stamp a series of neat, legible figures or letters in hot or cold metal—save time and labor as compared with stamping just one character at a time.

This hand-style hammer is machined from high grade tool steel with no rivets or welded joints. Hardened anvil base in type slot holds 1/16" to 1/2" steel type in consistently perfect alignment. Tool steel striking head will not mushroom or spall—can be easily removed and replaced when worn, thus greatly increasing life of holder.

Supreme Holders are available in many styles, types and sizes to meet your needs. Write for details.

with the
**Pannier
Supreme
STAMP HOLDER**

Pannier, specialist in design, engineering and manufacture of *all* types of marking equipment, also offers Steel and Rubber Stamps, Type, Dies; Stencils; Embossing Equipment; Marking Inks; and Special Marking Machines for any marking need. Write for recommendations.

Offices:

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Youngstown, Ohio, Philadelphia, Pa.



THE PANNIER CORPORATION

202 PANNIER BUILDING

Pittsburgh 12, Pa.

also can be easily held without the use of packing strips.

As shown in the accompanying illustration, the basis of the tool post is a central pillar, flanged at its lower end, with tongues engaging the slot in the lathe compound slide. A cap screw holds the pillar firmly in place, its lower end screwing into a tongued nut.

The tool block is rotatable on the pillar and can be clamped to the pillar by means of a screw which when tightened pulls together the faces of a saw cut. The block can be raised or lowered on the pillar by rotation of the adjusting screw working in a tapped hole in the block. The lower end of the adjusting screw bears on the flange at the bottom end of the pillar and takes the downward cutting thrust of the tool.

A Vee groove may be milled in bottom face of the tool holding slot for locating circular shank tools. It is al-

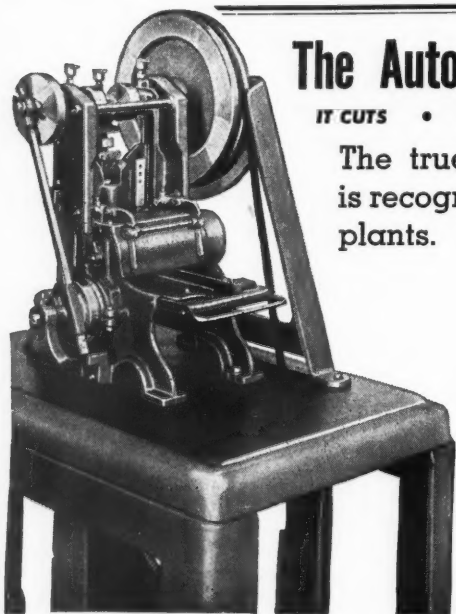
so better if the center hole for the pillar is finally machined to size with a light cut after the clamping "saw cut" has been made.

Although this tool post was made primarily for screw-cutting, it proved such a time saver that it was never removed from the lathe and has been used for all general turning jobs.

Universal Sine Plate

By R. L. McNEIL

IN conjunction with my work as afternoon supervisor of the Pontiac Motor Company's Apprentice School, I designed and constructed the universal sine plate shown in Fig. 1. As shown in the accompanying drawing Fig. 2, the device consists of a standard 6 x 14 x 16 inch cast iron cube A, to the corners of which are attached four 1½ inch diameter cylinders or rolls B. These rolls are hardened and



The Automatic FLEXOPRESS

IT CUTS • IT PUNCHES • IT PERFORATES

The true value of FLEXOPRESS is recognized in all well equipped plants.

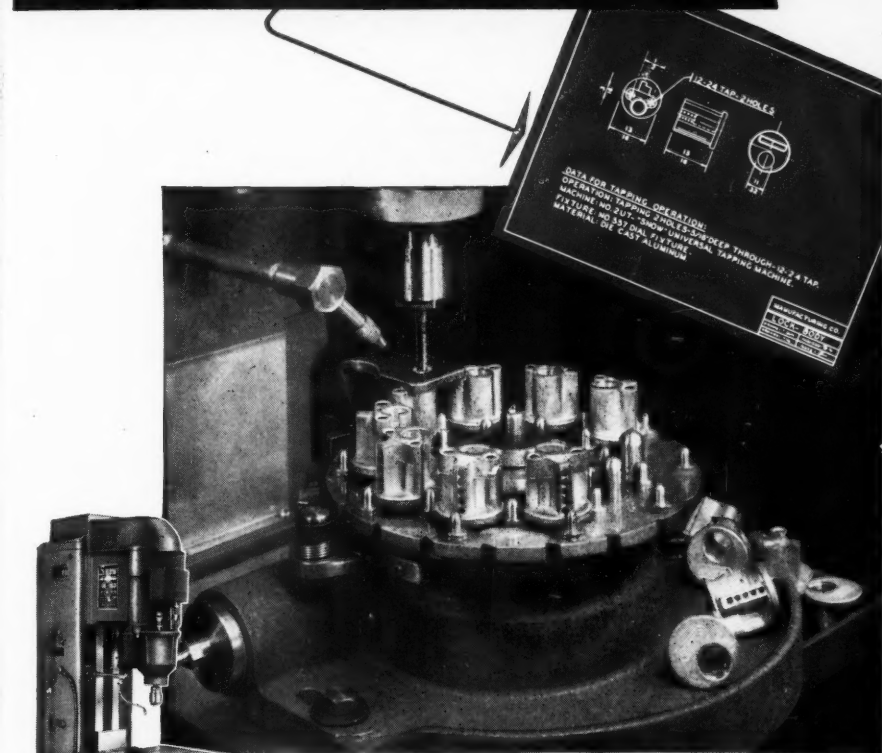
- Completely automatic — one operator tends 6 or more presses.
- High speed production — 9,000 to 40,000 pieces per hour.
- Cuts light metals and other materials in lengths to 9 inches.
- Low tooling costs.

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A PRODUCT OF

Ace Tool & Die Works

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Cincinnati 10, Ohio

SNOW FULL UNIVERSAL TAPPING MACHINE



The SNOW Full Universal Tapping Machine is complete with electric controls, motor driven lubricant pump, air operated table lift, and dirt and moisture trap.

All types of air operated indexing and clamping fixtures and jigs can be instantly synchronized with the cycle of the machine. The electric controls provide various types of operation to suit any specific tapping problem. Extreme sensitivity in the application of power eliminates tap breakage, and allows class 3 and 4 fits to be obtained at no loss in production.

Years of experience and thousands of installations enable us to assist you in any of your tapping requirements. Submit blue prints and sample parts for specific recommendations, production estimates, and tooling data.

SNOW MANUFACTURING COMPANY

443 EASTERN AVE., BELLWOOD, ILL. • SUBURB OF CHICAGO



Norton Announces...

A Revolutionary Process for Making Grinding Wheels Better . . . and Faster

PRECISE CONTROL is the keynote of the new Norton process for making vitrified grinding wheels—precision mixing, precision molding, precision electric burning. And precision in manufacture means a precision product.

Precise Size

Grinding wheels made by this new Norton process are dimensionally accurate within thousandths of an inch—machine readjustments when new wheels are mounted are practically never necessary.

Precise Balance

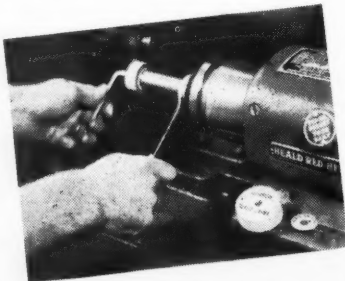
Because of precision molding and precision burning, precise balance is inherent in the wheels—it's there to start with and it stays as the wheels wear down.

Precise Grinding Action

The control methods of the new process have brought a new uniformity to grinding action not only throughout the life of each individual wheel, but from wheel to wheel and from lot to lot.

Faster Service

Not only does the new process make wheels better but also faster. Burning time alone has been cut from a matter of days to mere hours. Many customers who have been using wheels made in the pilot plant are already aware of the improved service that has been made possible by the revolutionary process.



Slip off the old wheel, slip on the new and start grinding—no machine readjustments are necessary, no changing of feeds or speeds because grinding action is different. Wheels made by the new Norton process are really uniform—both in dimensions and in grinding action.

NORTON ABRASIVES

A Vast, New Plant to House the New Process

FIVE ACRES of floor space—the largest building in the world for making grinding wheels—that's the new Plant 7 of Norton Company. It was especially designed to house the new grinding wheel manufacturing process envisioned by board chairman, George N. Jeppson, and perfected by Norton development engineers.

\$4,300,000 Investment

When this new process had been proved both in theory and by the very successful operation of a pilot plant, Norton was ready to invest millions of dollars in Mr. Jeppson's revolutionary idea. Ground was broken in April 1947 for this mammoth building—602 feet long and 320 feet wide.

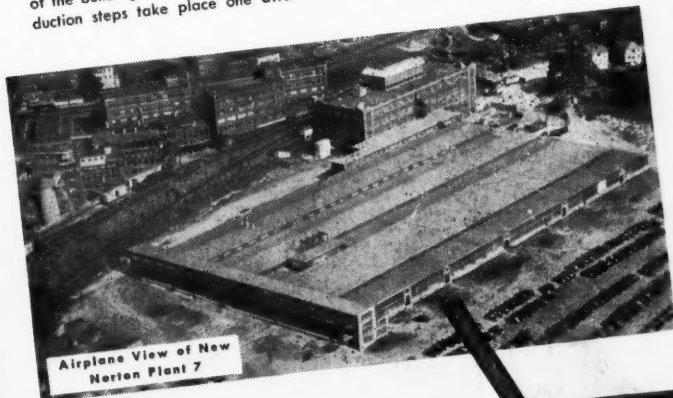
Straight Line Production

The new process lends itself ideally to straight line production and maximum use has been made of this in the new building. Abrasive grain and bond are brought into one end of the building and the various production steps take place one after

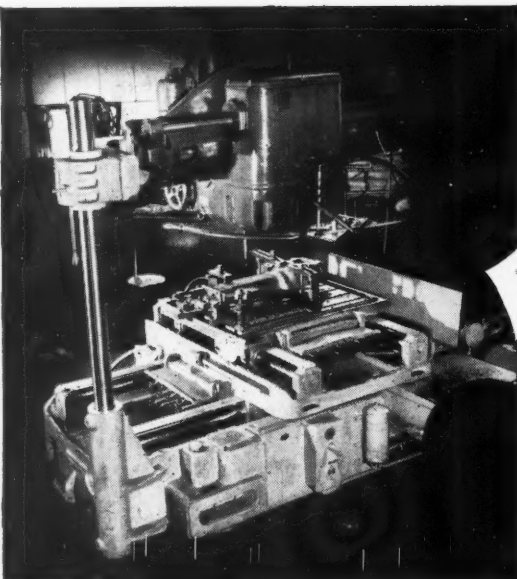
another—including a radically new and continuous electric firing process.

Ten Million Wheels Already Made

The complete success of the new process has been definitely proved by the ten million grinding wheels already made by it—first in the pilot plant and in recent months in the new building. Many customers, especially in the field of internal grinding, have been using the wheels and are enthusiastic about them. In both dimensional accuracy and uniformity of grinding action they are far beyond anything previously available in a grinding wheel.



Airplane View of New
Norton Plant 7



PRODUCTION NEWS ABOUT BULLARD MAN-AU-TROL SPACERS

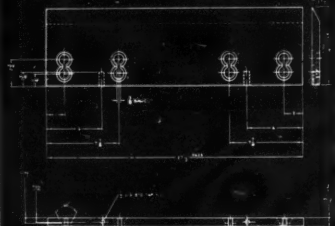
HERE'S HOW ONE LOOKS IN ACTION AND WHAT THE USER SAYS

This is a BULLARD 30" x 20" Man-Au-Trol Spacer being used by Kearney & Trecker, Milwaukee, Wisconsin with the following reported results: "We find that on parts where we do not have fixtures, the saving is considerable. We find that due to accurate positioning, we get more accurate work. We also find new uses every day; uses which we never thought of when we purchased the equipment."

HERE'S WHAT TWO OTHERS HAVE DONE

AT HEPPENSTALL COMPANY, PITTSBURGH . . . PRODUCTION TIME CUT BETTER THAN 36%

Drilling and countersinking 13/16" diameter holes in this chipper knife used to take 95 minutes per piece for layout and drilling. The same job done with a BULLARD 30" x 20" Man-Au-Trol Spacer, including setup time, takes only 60 minutes.



HOW MUCH CAN YOU SAVE?

Your first step toward learning how much you, too, can save in production time, jig fabrication and worker fatigue is to write for the latest Man-Au-Trol Spacer Bulletin. THE BULLARD COMPANY, Bridgeport 2, Connecticut.



AT R. HOE & CO., INC., NEW YORK CITY . . . OVER \$2500 IN JIG FABRICATION SAVED IN 3 MONTHS

This maker of fine printing presses not only saved time on every job handled by a BULLARD Man-Au-Trol Spacer but also eliminated 75 hole-locating jigs in three months for a total saving of \$2500 to \$3000.

**BULLARD CREATES NEW METHODS
TO MAKE MACHINES DO MORE**

GUARANTEED WATERPROOF
FOR WET OR DRY GRINDING
•
MAXIMUM HOLDING POWER
•
LONG LIFE CONSTRUCTION
•
FOR OPERATION ON
110 OR 220-VOLT D.C.

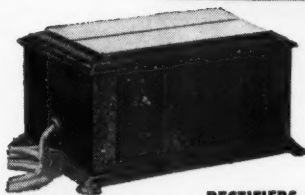
L-W MAGNETIC CHUCKS

5 3/4" x 13"
\$47.65
6 1/2" x 18"
\$63.15
8" x 24"
\$109.30
10 3/4" x 37"
\$202.05



DEMAGNETIZERS

A single pass over the stationary poles is sufficient to completely demagnetize work that has become magnetized through induction. Model B-2 for large work, complete with pilot light signal, switch and cord. Operates on 110 volts A.C. current. 7 3/4" wide, 12 1/2" long, 6 1/4" high. Shipping weight 35 lbs. **\$63.20**
Model J-1 for small work, complete with switch and cord. 7 1/4" wide, 7 1/4" long, 6 3/4" high. Shipping weight 35 lbs. **\$41.15**



RECTIFIERS

For converting A.C. into D.C. for use on magnetic chucks. A.C. input 110 volts. D.C. output 110 volts. For continuous duty and long life. P-1 for 5 3/4" x 13" chuck 0.8 amps., **\$38.75**. P-2 for 6 1/2" x 18" chuck 1.0 amps., **\$45.00**. P-3 for 8" x 24", 10 3/4" x 37" chuck 3.0 amps. **\$60.00**.



DEMAGNETIZING SWITCHES

for use on our 5 3/4" x 13" and 6 1/2" x 18" sizes. When the switch is thrown to "ON" position, the chuck is magnetized, and the work held firmly for grinding. When the work is to be released, the switch is thrown to "DEMOG" and contacts are touched momentarily to neutralize the chuck. **\$8.90**



Field discharge type for 8" x 24" and 10 3/4" x 37" **\$16.25**

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



L-W CHUCK COMPANY 28 SO. ST. CLAIR ST.
TOLEDO 4, OHIO



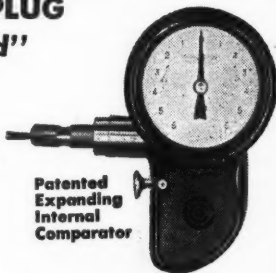
Fig. 1—Illustration Showing Universal Sine Plate in Use

ground and have a 90 degree section removed so that when they are positioned at the four corners of the cube

The universal sine plate is an ideal tool for use in making sheet metal layouts or for checking small tools and

their centers are exactly 14 and 16 inches apart. The cube is clamped to a hardened circular disc C which is free to rotate in a cast iron plate D. Suitable means are provided for raising and lowering the entire assembly against the face of a special angle plate E.

**Here's COMTORPLUG
the "Unrestricted"
Internal Gage
Gages precision
bores to fractions
of .0001".
"Unrestricted"
because —**



Patented
Expanding
Internal
Comparator

COST is so reasonable as to be practical for all quantity gaging applications.

PORTABILITY. Available anywhere instantly. Weighs but a few ounces. No hose, wire or fixtures.

SKILL OF USER. Anyone can use it with complete precision after a few tries. Automatic centering and alignment and uniform pressure assure this—experience in many war plants proves it.

SCOPE. Measures holes $\frac{1}{8}$ " to 8" dia. and larger, to fractions of one ten-thousandth. Shows true diameter and reveals out-of-round, front or back taper, barrel shape, bell mouth. Measures extreme bottom of blind holes.

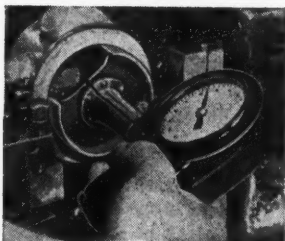
DEFINITENESS. Not a passing reading, but a fixed, definite reading, assured by automatic features independent of human errors or variations of feel or judgment.

Request Bulletin 33

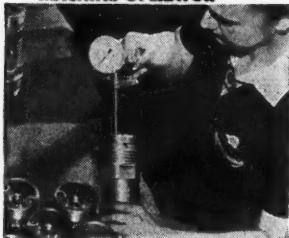
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MACHINE OPERATOR



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faster . better . cheaper

There are many reasons why leading manufacturers everywhere insist upon Noblewest Rapid Production Marking Equipment. But the big reason is simply this — Noblewest has kept pace with industry's demand for constantly higher marking speeds and lower costs per unit mark. As a result Noblewest is, today, the world's leading manufacturer of rapid precision equipment for the permanent marking of metal, plastic, hard rubber, wood, etc. Why not put your marking problems up to Noblewest Engineers? There's no obligation. Write Noble & Westbrook Manufacturing Company, 25 Westbrook Street, East Hartford 8, Conn.



Model 275, illustrated above, is shown tooled for marking and grooving telephone wire splicing tubes. Pieces can be marked up to 125 per minute. Simple gravity feeding and unloading are both automatic and fool-proof.

MARK IT
BEST WITH

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IMPROVED
MARKING
DEVICES

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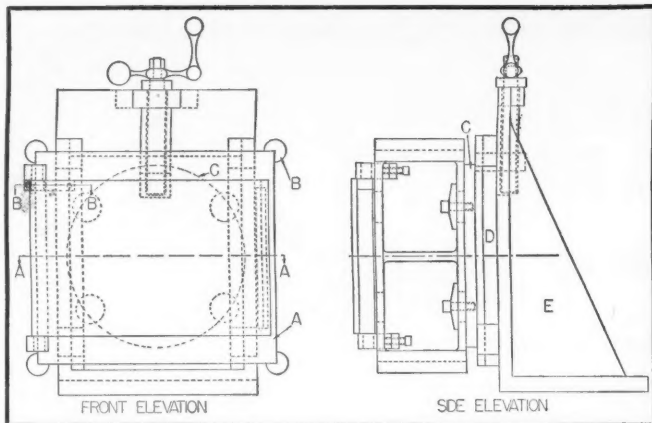


Fig. 2—Drawing Showing Front and Side Elevations of Universal Sine Plate.

out from the face of the cube when any compound angles are to be laid out or checked.

gages. With the aid of a set of gage blocks and a table of natural sines, the cube can be rotated and set with great accuracy to any angle in the entire 360 degrees. An auxiliary 15 inch sine plate may also be provided that opens

Modernizing Old Grinders

By D. E. McDONALD

OCCASIONALLY with a few changes which involve only a minimum amount of expense an old

PRACTICAL CARBIDE CUTTERS

**LOW INITIAL COST
GREATEST FLEXIBILITY**

• **LOW BLADE COST**
• **LOW MAINTENANCE**

Howald Milling Cutters give you practical advantages in carbide milling . . . The locking devices hold square blades without serrations, grooves or other limiting elements . . . Blades can rapidly be removed, replaced or adjusted accurately . . . End Mills—1½"-3" diameter . . . Shell Mills—3"-6" diameter . . . Face Mills—8⅜"-14" diameter.

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DESIRABLE TERRITORIES AVAILABLE

W. T. HOWALD MACHINE WORKS
182 Sigourney Street Brooklyn 31, N. Y.

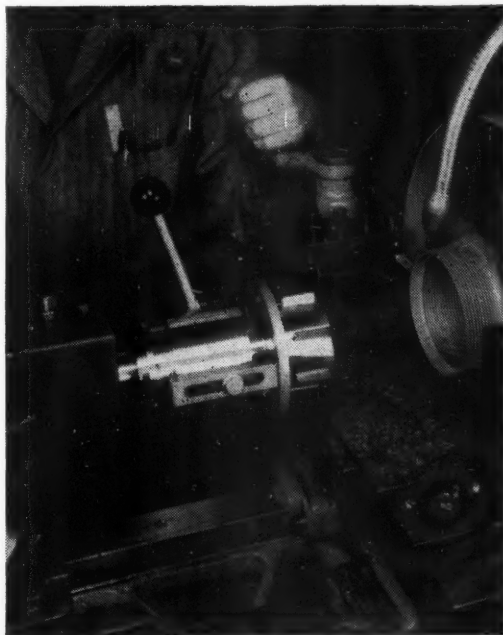
PRECISION THREADING

FAST!

with NAMCO RST collapsible taps



Cast-iron pipe fittings: I. D. cut with Namco RST 4"—6 blade chaser tap at 50 surface feet per minute. O. D. cut with DS 4 1/8" ground-thread circular-chaser Namco Vera-O-Tool.



IT'S ACCURATE—The Namco RST Collapsible Tap has a minimum of parts; fewer to adjust and fewer to wear. Compact construction and unique core piece design insure rigid chaser support—for uniform, precision threads.

IT'S FAST—Quick (trigger) positive collapsing at the end of a cut is a feature. Three convenient means of quick collapsing and resetting provide fast operation on all horizontal and vertical machines.

IT'S VERSATILE—The same head is applicable to both stationary and revolving spindle machines.

IT'S SIMPLE—One screw and collar adjusts all chasers simultaneously to fine diametric adjustment.

* * *

RST Collapsible Taps are equipped with blade-type chasers for straight or taper threads in sizes 1" to 4". Both types are hardened and ground throughout. Write for catalog and prices.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics:
1-4-6 and 8 Spindle • Hydraulic Thread
Rolling Machines • Automatic Threading Dies
and Taps • The Chronolog • Limit Motor Starter
and Control Station Switches • Solenoids
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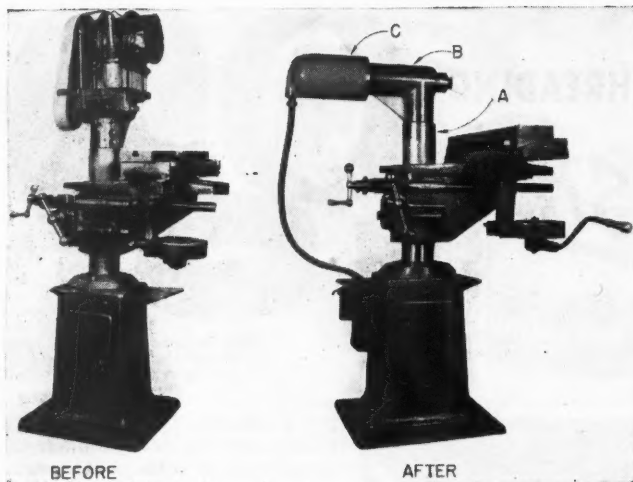


Illustration Showing Views of Both Old and Modernized Grinder

grinder, we completely overhauled the remaining parts. The overhaul job consisted of planing the ways, scraping them in, and installing new gibs. We also replaced the old gearing and feed screws.

Upon completion of the over-

haul work, we designed the Meehanite head shown at B, which we then fastened to the grinder column, as shown at A, by means of two set screws and a key. A 1 H.P. Pope spindle C was then installed in the head. That portion of the head in which the spindle is located is split. Thus, the spindle is held firmly in position by means of two set screws which, when tightened, provide a clamping action around the spindle body.

After the grinder shown in the "After" view was placed in service, the results were most gratifying. We are now in the process of modernizing four more machines in the same manner.

By referring to the accompanying illustration, you will note that we selected a grinder of somewhat ancient vintage to modernize. After removing the entire spindle assembly of this

machine tool may be economically modernized. For example, we found that since many of the grinding operations which were being performed in our plant did not require the use of a full universal grinder, we could considerably reduce manufacturing expenses by modernizing our old grinders. We found, too, that by following this procedure we were in a better position to use our new grinders on highly specialized work which called for extreme accuracy.

DELIVERY FROM STOCK!

Milwaukee Angles with their sturdy construction and accurate finish make short work of your measuring problems. Four styles and over twenty different sizes are available to fill your specific requirements. A catalog and price list are free upon request.

J. C. BUSCH COMPANY

Engineers and Machinists Since 1907

126 E. PITTSBURGH AVENUE

MILWAUKEE 4, WISCONSIN



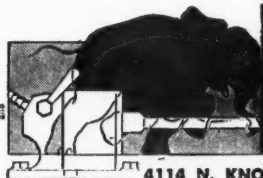
Boost Output with **MEAD** **WORK FEEDERS**

Feed Work Fast to Drill or Tap!



As-fast-as-you-can-step-on-a-button the sensational new Mead pneumatic **WORK FEEDER** delivers, holds, ejects small parts to be drilled, reamed or tapped. Accommodates stampings, castings, screw machine parts, etc. Adjustable to sizes up to 3". Foot or automatic control; operator's left hand is free to keep hopper loaded.

Write for new Mead **AIR POWER** Catalog describing "Mead Family" of air operated fixtures and devices.



MEAD

SPECIALTIES COMPANY

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News of the Industry

Kennametal Inc. to Further Expand

An expansion program involving an expenditure of over \$200,000 is now under way at Kennametal Inc., Latrobe, Pa., according to an announcement made by Alex G. McKenna, vice-president. This is the second extension of plant facilities to be made within one year, the mining tool division having moved into enlarged quarters last March.

Under the expansion program, a new building will be erected at the rear of the property and an addition made to the laboratory which fronts on Lloyd Avenue. Both structures will be of steel and brick construction and will be ready for occupancy early in December. The new plant building, having 6,000 square feet of additional floor space, will provide a more convenient and favorable location for the carbide division. It is to have modern means of air conditioning for the control of dust, moisture, and temperature.

The laboratory extension will include 1,600 more square feet of floor space, providing additional working area and special facilities for general research and development work. The enlarged space will also permit more advantageous arrangement of existing apparatus and accommodation for more new equipment to increase research and development work on the company's new high temperature compositions, as well as other new metallurgical projects. Additional testing equipment for research and control purposes will be installed.

K. R. Wilson Passes

Kirke R. Wilson, hydraulic press manufacturer and nationally known designer and builder of specialized automotive repair and service tools died in Detroit on Saturday, September 25. He was 59 years old.

"K R", as he was familiarly known to thousands, came up the hard way. He made his first start in the business world repairing bicycles in one end of an old

barn in Arcade, N. Y. From bicycles he graduated to the Arcade Ford dealership. In 1913, Mr. Wilson came to Buffalo and opened a Ford part and accessory business. His experience in this field pointed out the need for specialized tools and equipment in order to economically service and repair Ford cars and trucks. His first invention—a bushing reaming machine for the old Ford Model T planetary transmission—was an instant success with Ford dealers the world over.

Mr. Wilson's entry into the hydraulic press manufacturing field was the direct result of building equipment for Ford dealers. To speed many pressing operations in connection with regular Ford service, the factory developed a small, 35-ton hydraulic arbor press in 1923. From this modest beginning, the Wilson line has grown so that it now includes pressing equipment ranging from 25-ton arbor presses to 100-ton hydraulic blanking, stamping, and forming presses.

The sales, engineering, and manufacturing organization which Mr. Wilson built up over a period of 32 years will continue to operate. To fulfill plans made by Mr. Wilson more than a year before his passing, Jack A. Ahern, for a quarter of a century a close friend and business associate, will assume top management of the Wilson organization, with headquarters in the Buffalo office. Frank Wilson, brother of the founder, will continue to superintend the plant operations at Arcade.

Did You Know?---

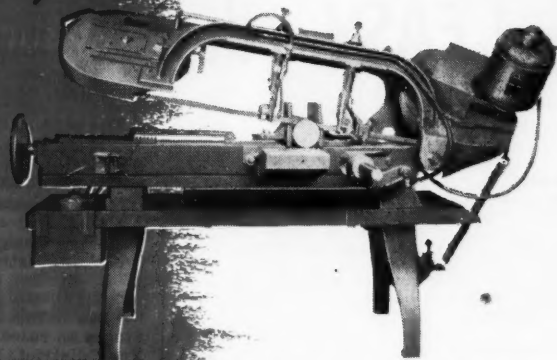
The National Tool & Die Manufacturers Association will hold its annual meeting on November 14-17 at the Hotel Schroeder, Milwaukee, Wisconsin. Business sessions will be conducted on Monday and Tuesday, the 15th and 16th, with the annual dinner on Tuesday evening.

The Morse Twist Drill & Machine Co., New Bedford, Mass., has announced the appointment of A. L. Carr as sales manager. Mr. Carr was formerly assistant sales manager and has been with the Morse organization for 32 years.

*Here's the saw that takes the work
out of cutting metal --*

the WELLS No. 8

metal cutting band saw



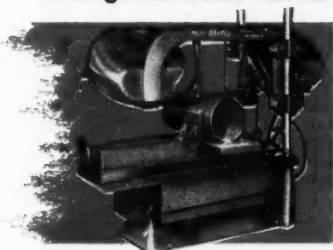
Illustrated is the Wells No. 8 with wet cutting system, an economical extra that makes possible higher cutting speeds and longer blade life.

For cutting metals—rounds, squares, tubing or odd shapes—the Wells No. 8 will do the job for you in less time, with less effort. It's easy to operate, and the quick-acting vise makes set-up time a matter of seconds. Counterbalanced head with hydraulic frame check permits the operator to perform other duties while the cut is being made. For production or general utility, the Wells No. 8 has speed, accuracy, versatility and pays for itself in more economical metal cutting. Ask your Wells dealer to give you all the details or write to the factory today.

TECHNICAL DATA

CAPACITY: Rounds.....8" dia.
Rectangular.....8" x 16"
With special guides.....5" x 24"
SPEEDS: Selective.....	60, 90, 130 ft. per min.
MOTOR.....	1/2 H.P.
WEIGHT, Approximate.....	750 lbs.

For heavy-duty metal cutting—the WELLS No. 12



The Wells No. 12 Metal Cutting Band Saw features an automatic cutting cycle and controlled blade pressure. Capacity: 12 3/4" O.D., rounds; 12" x 16" rectangular. Wet cutting system standard equipment.

See Wells Saws in Action—Booth 1661, Metal Show

Wells SAWS
THE WAY TO SERVICE

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

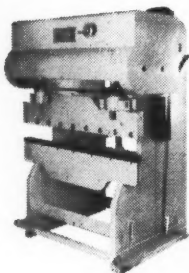
**WELLS MANUFACTURING CORPORATION
808 TYLER STREET, THREE RIVERS, MICH.**

Built like a rock but **EASY** on the budget

●**KNIGHT** Press Brakes' features include heavy welded construction, generous bearings, all controls located in front. Micrometer dial permits adjustments to .001". Visible extreme ram position indicators. Many features found only on expensive machines . . . built into these low-cost press brakes designed to relieve your larger, more expensive equipment.

KNIGHT PRESS BRAKES

Five sizes: 2, 3, 4, 5 and 6 foot capacities. Equipped with Link Belt anti-friction bearings, Cutler-Hammer controls, Reeves variable pitch pulley drives, Westinghouse motors, Twin Disc clutches. Designed also to facilitate quick and easy repairs and replacements.



◀ **Write FOR**
DESCRIPTIVE CATALOG
No. 8



Did You Know?---

The **Hanchett Magna-Lock Corp.**, Big Rapids, Mich., has been organized to manufacture the line of magnetic chucks formerly produced by the Hanchett Manufacturing Company, also of Big Rapids. Officers of the new company are **J. F. Manting**, president; **D. D. Stone**, vice president and treasurer; and **R. V. Hanchett**, secretary.

The appointment of **Marcus A. Markley** as manager of Sun Oil Company's Industrial Products Department has been announced by **Samuel B. Eckert**, vice president in charge of manufacturing. Mr. Markley succeeds **Ray H. Anders**, who has been assigned to do special work in the Administrative Department.

Kennametal Inc., Latrobe, Pa., has announced the appointment of **John A. Storrs** as sales representative in the New York district. Mr. Storrs will work out of the Kennametal office at 6 West Broadway, New York.

The Crucible Steel Company of America, 405 Lexington Ave., New York 17, N. Y., has announced the appointment of **Michael Stumm** as manager in charge of its advertising department.

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the appointment of **Carl J. Lamb** as consulting engineer. His duties embrace the investigation and reporting to management on projects dealing with markets, products, and other matters having an important bearing on the company.

Economy Engineering Company, maker of portable elevators, barrel racks, and other materials handling equipment, has moved its entire manufacturing facilities to a new plant at 4511 West Lake Street, Chicago 24, where approximately double the former shop floor space is available, as well as ample room for greater efficiency in the layout of production and shipping facilities.

E. B. Forse, formerly manager of The Carborundum Company's Refractories Division, has been appointed assistant vice president. **C. E. Hawke**, previously director of sales for Carborundum, has been named manager of the Refractories Division. **E. R. Baxter** has been appointed director of sales and sales administration to succeed Mr. Hawke, while **G. R. Rayner, Jr.**, has been named assistant director of sales administration under Mr. Baxter.

• OPERATIONS

• APPLICATIONS

• CUTAWAY VIEWS

MILL HEAD

CATALOG

Free

NOW READY

See the New Rusnok Rail Type Bracket that permits use of Mill Head in any position around over-arm of your horizontal mill. For vertical and single or compound angular operations. Rusnok Mill Head and Brackets are available for conversion of all popular makes of milling machines.



HEAVY DUTY

RUSNOK

ATTACHMENT

MILLING • DRILLING • BORING

RUSNOK TOOL WORKS • 4840 W. NORTH AVENUE • CHICAGO 39, ILL.

November, 1948

MODERN MACHINE SHOP 199

Did You Know?---

Three additional distributor outlets for its complete line of Ampco-Trode, Phos-Trode, Sil-Trode, and Beryl-Trode electrodes have been announced by Ampco Metal, Inc., Milwaukee 4, Wis. They are the **Welding Engineering Sales Corp.**, Buffalo and Syracuse, N. Y.; **Southern Oxygen Co., Inc.**, Knoxville, Tenn.; and **Arizona Welding Equipment Co.**, Phoenix, Arizona.

William F. B. Henderson, formerly general sales manager of the Briggs Manufacturing Company's plumbing division and for the past four years executive vice president and director of the Clearing Machine Corporation, Chicago, has been appointed executive vice president and a member of the board of directors of the **E. W. Bliss Company**, manufacturer of mechanical and hydraulic presses, rolling mills, and can and container machinery.

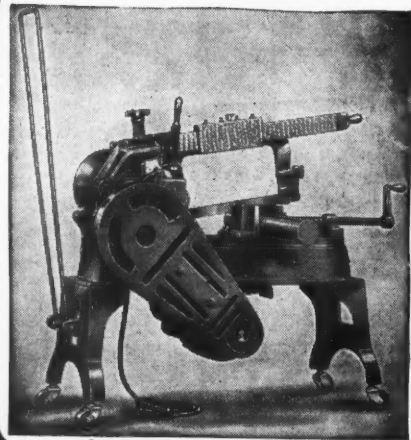
In order to take care of expanding business, the **Quaker Chemical Products Corp.**, Conshohocken, Pa., has let contracts for the erection of additional plant space which will cover approximately 20,000 square feet.

W. A. McLaren Export Corp., Ltd., 302 Crown Bldg., 615 W. Pender St., Vancouver, B. C., has been appointed sales representative in Western Canada by The Cleveland Tapping Machine Company, producer of standard and special precision single and multiple hole production tapping machines and accessory jigs, fixtures, and feed devices.

C. E. Walker, designer of hydraulic duplicating attachments for machine tools and formerly associated with Turchan Follower Machine Company of Detroit as part owner and vice president in charge of sales and product development, has announced the establishment of the **Walker Hydraulic Duplicator Company** at Standish, Michigan.

Phil Huber, president and general manager of the Ex-Cell-O Corp., Detroit, Mich., has announced the following promotions in the executive personnel of the company: **James K. Fulks**, vice president in charge of manufacturing, to director of the company, as well as an active officer; **John F. Miller** to sales manager of the Machine Tool and Cutting Tool Divisions; and **D. H. McIver** to sales manager of the Aircraft and Miscellaneous Parts Divisions.

SAWMASTER HACK SAW



LOW PRICED

PORTABLE
SELF-CONTAINED

READY TO WORK

Angle
Cutting
Vise

STURDY
ECONOMICAL

Write for Bulletin
No. 300

MILLER-KNUTH MFG. CO. OMAHA, NEB.

INGERSOLL SHEAR CLEAR

The Ultimate in Face Milling

FOR MILLING:

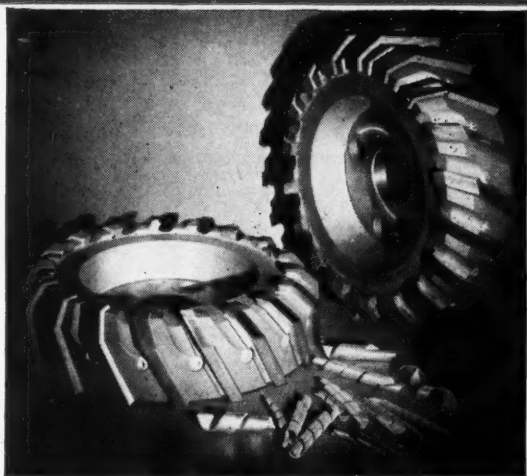
Cast Iron
Steel
Aluminum
Non-ferrous alloys

WITH BLADES OF:

High Speed Steel
Super High Speed Steel
Cast Alloy —
Rexalloy and Stellite
Carbide Tipped
Cast Alloy Tipped

PRODUCES:

Increased Production
Superior Finish
Longer Tool Life
Low replacement
blade cost
Small initial investment



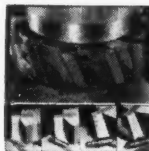
WE CAN PROVE THAT: The Ingersoll patented *Shear Clear* face mill will outperform all other cutters. It is not "just another milling cutter", but a special tool. There is not just one *Shear Clear* but several different types. Each is developed for a specific application, using variations in cutting angles, blade materials and grades of carbide. The combination of cutting with a bevel using apparent steep positive axial

rake and negative radial rake angles produces a new revolutionary cutting action. *Shear Clears* cost no more than ordinary conventional types of face milling cutters. You should take advantage of them.

May we have an engineer call and recommend the proper *Shear Clear* for your shop so you too can profit from the ultimate in faster milling?



Shear Clears with carbide tipped blades milling cast iron cylinder block at 48" per minute feed, \$75 ft. min., removing 1/8-3/16" stock.



Note how Shear Clear chip is forced to coil out along the blade away from finished surface and is thrown clear of cutter at end of cut. This action produces smoother finish, faster feed, longer tool life, and less power requirements.



Milling SAE 9330 test block with 10" diameter Carbide tipped Shear Clear. 3/4" stock, 8" wide cut, 300 ft. min., 10" feed, 105 horsepower.

SEND FOR CUTTER CATALOG—

Use this handy coupon



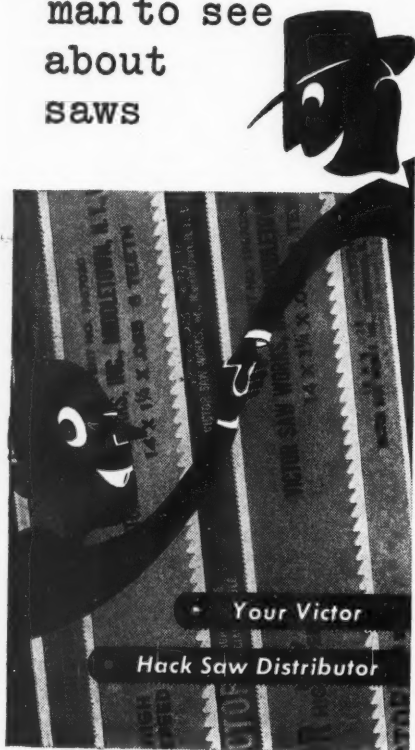
Complete information on Ingersoll Shear Clear and all other types of inserted blade milling and boring tools... illustrations, detail drawings, specification tables, grinding charts, how to order.

**THE INGERSOLL MILLING MACHINE CO.
ROCKFORD, ILLINOIS**

Please send copy of Cutter Catalog 56A

FIRM.....
ADDRESS.....
CITY.....STATE.....
NAME.....TITLE.....

meet the best
man to see
about
saws



Get acquainted with your Victor Hack Saw distributor. He'll be glad to show you how to cut metals and non-metals easier and faster, and cut costs too with Victor Hack Saw Blades.

And while you're at it ask him for the NEW Victor Wall Chart for your workshop — the Victor Metal Cutting Booklet for your pocket or tool kit — both are packed full of helpful information . . . ABSOLUTELY FREE.

VICTOR

SAW WORKS INC.
MIDDLETOWN, N. Y.

Makers of hand and power hack saw blades,
frames and band saw blades.

Did You Know?---

A. A. Vetter has been appointed consulting sales engineer for the Buhr Machine Tool Co., Ann Arbor, Mich., according to an announcement made by Joseph H. Buhr, company president.

Rogers and Baxter, 2013 Olive St., St. Louis, Mo., has been appointed exclusive representative for Hydro-Line air and hydraulic cylinders and special machinery in the territory including the southern part of the State of Illinois and the entire States of Missouri, Iowa, Nebraska, Kansas, and Oklahoma.

C. J. Edwards, Inc., 2209 Fisher Bldg., Detroit, Mich., has been appointed representative in the automotive manufacturing and industrial fields for the State of Michigan by the Tyson Bearing Corp., Massillon, Ohio, producer of tapered roller bearings.

Samuel M. Gahagen, formerly of the Rustless Iron and Steel Corp., Baltimore, Md., has been appointed chief metallurgist by the Jessop Steel Co., Washington, Pennsylvania.

C. E. Johnson & Associates, 404 Bona Allen Bldg., Atlanta, Ga., has been appointed sales agent in the territory of Alabama, Georgia, Florida, and eastern Tennessee for the industrial filtration products manufactured by the U. S. Hoffman Machinery Corp., Syracuse, New York.

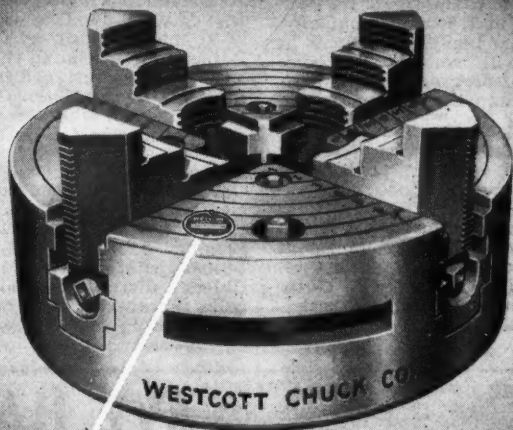
Ralph M. Hoffman, president of the Link-Belt Company, Pacific Division, San Francisco, has been elected a vice president of the parent Link-Belt Company in Chicago.

The Tyson Bearing Corp., Massillon, Ohio, manufacturer of the "All Rolls" design tapered roller bearing, has appointed R. A. Rodriguez, Inc., 55 West 42nd Street, New York City, as export representative for all foreign countries, except Canada.

The Walker-Turner Division, Kearney, & Trecker Corp., Plainfield, N. J., has announced the appointment of V. Paul Yale as district representative in charge of the States of Michigan and Indiana.

At a recent gathering of the department heads of the Clover Manufacturing Co., Norwalk, Conn., George A. Fish, sales manager, was honored in celebration of his 30 years of continuous service with the company. In appreciation of his outstanding record, Mr. Fish was presented with a check for \$1,000.

WESTCOTT *Chucks*



Masterpieces of Precision



Look for the Red Name Plate
—your guarantee of accuracy
and dependability in Chucks

PRECISION MANUFACTURERS SINCE 1872

WESTCOTT CHUCK COMPANY
700 EAST WALNUT STREET
ONEIDA . . . NEW YORK

Send FOR
LATEST CATALOG



PRECISION • DEPENDABILITY • SERVICE

Did You Know?---

Announcement has been made by the Farrel-Birmingham Co., Inc., Ansonia, Conn., that **Robert M. Honegger**, general manager of the company's Buffalo plant, has been elected a member of the board of directors.

Forrest E. Allen, formerly a member of the faculty of Iowa State College in the department of mechanical engineering and associate professor in charge of the instruction on metallurgy, has joined the Development and Research Division of The International Nickel Company, Inc. He will make his headquarters at New York and will work on the company's educational program with universities and colleges in the United States.

Roy S. Rankin has resigned as vice president and director of sales of Harris Calorific Sales, Inc., Detroit, producer of gas welding equipment, to become manager of the Progressive Welder Sales Company of Michigan, Maccabees Bldg., Detroit, according to an announcement by **John D. Gordon**, general manager, Progressive Welder Co., 3050 E. Outer Drive, Detroit, manufacturer of resistance welding equipment.

John E. Shriver, former sales manager of the Avey Drilling Machine Company, has purchased and is operating the **L & H Tool & Die Co., Inc.**, Covington, Kentucky.

The appointment of **John Best & Associates**, Toronto, as distributor in Canada for Buckeye portable air and electric tools has been announced by **H. O. Gummere**, vice president of the Buckeye Tools Corp., Dayton, Ohio.

B. N. Brockman, Jr., has been appointed advertising manager of The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio, manufacturer of a complete line of lathes. Mr. Brockman succeeds **Sidney R. Best** who has resigned in order to return to Perry-Brown, Inc., Cincinnati advertising agency, where he will serve as account executive for LeBlond and others.

The Billings & Spencer Co., Hartford, Conn., has announced the appointment of **George W. Schwager** as sales manager to succeed **W. Dorsey Endres**, who has resigned. In addition, **W. T. Johnston** has been appointed as sales manager of the Chicago district and **John Donaldson** as sales representative in Metropolitan New York and upper New Jersey.



**SAVE HANDS
WITH STRANDS**

**Safeguards
For Punch
Presses**

**Send for Enclosure
and
Sweep Safeguard
Circulars.**

STRAND MFG. CO., INC.
611 West Lake Street
Chicago 6, Ill.

SIBLEY

MODEL C-20

DRILLING MACHINE

QUALITY

70 years manufacturing drilling machines provides quality standards. All parts except motors, switches, V-belts and bearings produced in our plants. High tensile strength castings made in our foundry under laboratory analysis control.

ACCURACY

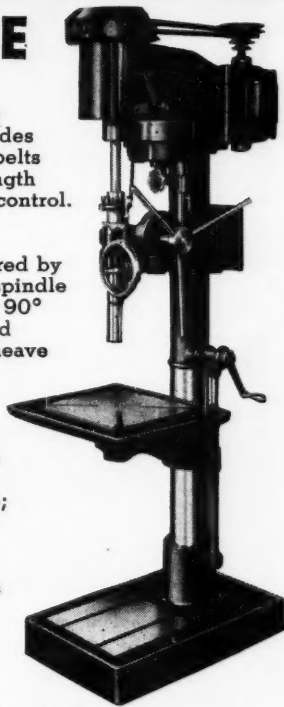
Table alignment is assured by boring table arm with spindle furnished on machine. Surface of table is maintained at 90° to spindle within .0007" in six inches. Precision ground spindle has two ball thrust bearings. Spindle driving sheave and back gear are supported by two ball bearings.

FEATURES

20" swing; drills 1½" in mild steel; 8 spindle speeds from 65 to 1360 R.P.M.; geared power feeds; simple and convenient controls; automatic spindle stop; rectangular oil groove table.

PRICE

Model C-20 machine as illustrated complete with 2 H.P., 3 phase, 60 cycle, A.C. motor and magnetic type starting switch \$849.75, F. O. B. South Bend, Indiana.



SIBLEY

MACHINE & FOUNDRY CORP.

39 EAST TUTT STREET
SOUTH BEND 23, INDIANA

SIBLEY MACHINE & FOUNDRY CORP.
39 East Tutt St., South Bend 23, Indiana
Send Catalog No. 67, Free!

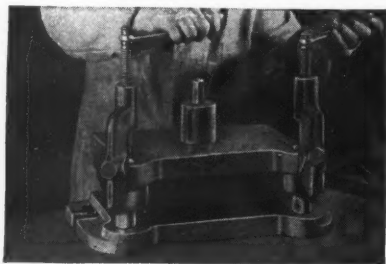
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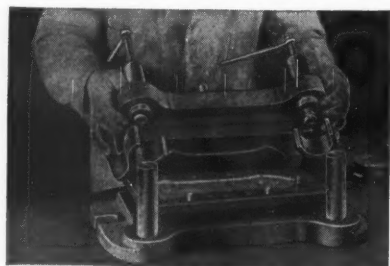
CITY _____ STATE _____

Tool and die makers Save up to 50% in time alone...

with ACRO Die-set PULLERS



No frayed nerves here. No pounding, no prying. Simply attach an ARCO PULLER to the die set. The patented index screw wrench raises punch holder straight upward . . . and



holds it at any height, or removes it entirely. No lost time. No damaged set.

Acro Pullers are indispensable for grinding, mounting and fitting punches...quickly, smoothly, accurately.

Write for details.

ACRO Metal Stamping Co.

333 E. Reservoir Ave., Milwaukee 12, Wis.

Did You Know?---

Delapena & Son, Ltd., Cheltenham, England, has announced that **The Motch & Merryweather Machinery Company**, Cleveland, is now the exclusive selling representative for its external honing equipment in the continental United States.

J. H. Williams & Co., Buffalo, N. Y., manufacturer of drop-forgings and drop-forged tools has announced the opening of a warehouse and sales office at 2266 E. 38th St., Los Angeles (Vernon), Calif. **Charles F. Coates** has been appointed Western district manager and is in charge of the new sales office and warehouse.

The annual meeting of the **Society for Experimental Stress Analysis** will be held at the Hotel Commodore, New York, on December 2, 3, and 4, 1948. Inquiries should be addressed to the Society at P. O. Box 168, Cambridge 39, Massachusetts.

Merit Products, Inc., Los Angeles, maker of Sand-O-Flex sanding wheels and abrasive cartridges, has announced the appointment of **F. W. Anderson**, 800 North Clark Street, Chicago, as sole sales representative for the Illinois and Wisconsin territory.

Paul S. Strecker, assistant to the president, has been appointed works manager of the Toledo Machine & Tool Division of **E. W. Bliss Co.**, Detroit, Mich. **R. E. Hinde**, formerly works manager at Toledo, is continuing at the Toledo plant as assistant to the works manager handling special assignments.

Arthur E. Kimball, Chicago zone sales manager for related products of the Minnesota Mining & Manufacturing Co., St. Paul, Minn., has been promoted to manager of development and sales for heavy grinding products in the company's coated abrasives division.

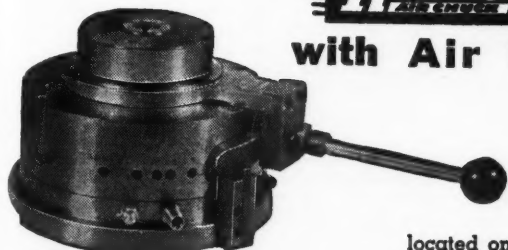
James Y. Scott, president of the Morse Twist Drill & Machine Co., New Bedford, Mass., has announced the appointment of **J. C. Kuhn** as general sales manager of the company, succeeding **Mort Rainey** who has resigned as vice president and sales manager to pursue other interests.

Lester B. Hamersley, formerly assistant sales manager of Signode Steel Strapping Company of Chicago, as well as division manager of Fairbanks Morse & Company, has been appointed sales promotion manager by the Firth Sterling Steel & Carbide Corporation, with headquarters at McKeesport, Pennsylvania.

"Air Devices by Redmer"



Index Chuck with Air Operated Collet



RC-5

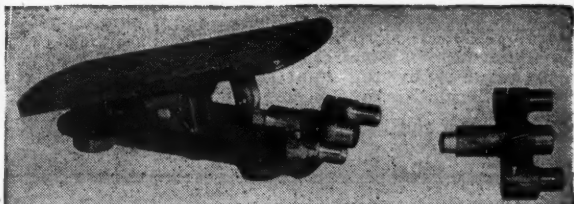
Eliminates removing chuck from base of machine for changing index position. Index screw posts

located on OUTSIDE of chuck. Provides positive alignment and depth control by using stationary type collets. Capacity 1/16" to 2".



Air Foot Control and Valve

Designed to make its operation as tireless as possible. Opening and closing of plunger of valve on foot pedal is operated by a roller on pedal casting which relieves wear on plunger and facilitates operation. Valve is a brass casting which will take plenty of abuse and can be removed from the foot control and used as a separate unit in connection with cam operations.



No. FC-28

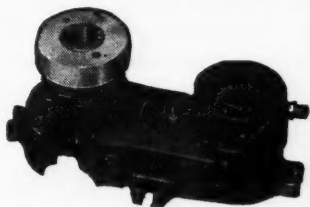
V-29



Collet Air Chuck

An air operated collet holding fixture using same type collets as Brown & Sharpe automatic screw machines. For drilling, milling, threading, etc., also for assembly work. Six models, No. 00, No. 10, No. 0, No. 2, No. 2 Special, No. 4, Collet Capacity 1/16" to 3/2". AVAILABLE WITH AIR EJECTION OR OIL FLUSHING.

Write for literature and prices



REDMER AIR DEVICES CORP.

9132 W. BELMONT AVENUE, FRANKLIN PARK, ILL.

Did You Know?---

S. C. Lawson, assistant general sales manager of Ampco Metal, Inc., Milwaukee, Wis., has been appointed general sales manager, succeeding **R. J. Thompson** who will be located in California where he will serve as engineering and sales manager for Ampco's West Coast activities. **J. P. Henry**, former Eastern zone manager, succeeds Mr. Lawson as assistant general sales manager. **E. E. Whitson**, Philadelphia district manager, has been named advertising manager. Other changes in the sales organization of Ampco include the transfer of **J. E. Cook** from Cincinnati to Philadelphia as district manager; **F. A. Burnett** from Indianapolis to Cincinnati as district manager; and **W. F. Taff** from sales engineer in the Indianapolis district to manager of that district.

The entire common stock equity in Vascoloy-Ramet Corporation held by Vanadium-Alloys Steel Company has been acquired by the **Fansteel Metallurgical Corp.**, North Chicago, Ill., according to an announcement made by **Robert J. Aitchison**, president.

The **Geometric Tool Co.**, New Haven 15, Conn., producer of machinery and tools for cutting screw threads, has appointed the **Mideke Supply Co.**, 100 E. Main St., Oklahoma City, Okla., as its distributor for the State of Oklahoma.

Aldus C. Higgins, 75, for nearly a half century closely identified with the Norton Co., Worcester, Mass., died September 10 at his home. At the time of his death, Mr. Higgins was chairman of the Norton Company executive committee.

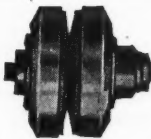
Samuel J. Matchett has been appointed manager of the Detroit office of Pratt & Whitney, Division Niles-Bement-Pond Company, at 2836 E. Grand Boulevard where he will head machine tool sales in the State of Michigan.

Hoffman-Marquard Iron & Machine Co., St. Louis, Mo., has been appointed dealer in the Mississippi Valley area for the line of open back inclinable punch presses made by the **L & J Press Corp.**, Elkhart, Indiana.

Emil R. Gasser, director of research of the **Farrel-Birmingham Co., Inc.**, Ansonia, Conn., died suddenly at his home in Buffalo, New York, on September 5.



HI-LO



VARIABLE SPEED PULLEYS

• **Hi-Lo Variable Speed Pulleys** give infinite variable speed on any constant speed motor. Using standard V-belts, they maintain constant speed at any set point, no matter how the load varies and automatically regulate belt tension to the load. This is accomplished by a cam action within the Pulley, eliminating heavy springs and prolonging belt life. **Hi-Lo Pulleys** can be conveniently installed on machines already in service or incorporated into new ones. Furnished from fractional up to 5 HP, they will give a thousand speeds with any constant speed motor.

EQUIPMENT ENGINEERING CO.

2853 COLUMBUS AVE. SO.

MINNEAPOLIS 7, MINN.

SEND FOR COMPLETE CATALOG

Griffin
MOLYBDENUM HIGH SPEED STEEL

Your Best Buy for **Production Metal Sawing**

GRIFFIN SPECIAL ALLOY Molybdenum High-Speed Steel Blades of tough, specially Griffin-tempered steel, are a most economical buy, for they often out-cut ordinary tungsten steel blades eight to ten times. Uniform raker-set teeth that *bite*. Power machine and hand frame sizes.

OTHER GRIFFIN BEST BUYS

Griffin Tungsten High Speed Steel Blades, for cutting very toughest alloys . . . Improved New Griffin hand saw blades, flexible as a soft-back, tough as an all-hard . . . Griffin Non-Strip—teeth do not break out even when sawing thinnest sheet or tubing—hand frame sizes.

Write for latest Price List.

General Sales Agent

JOHN H. GRAHAM & CO. Inc.
Dept. D, 105 Duane St. New York 8, N. Y.

ASK YOUR DISTRIBUTOR FOR

GRIFFIN



Hack Saw Blades

MADE BY G. W. GRIFFIN CO., FRANKLIN, N. H.
Hack and Coping Saw Blade Specialists Since 1880

Woodworth Engineered Products

PRECISION GAGES

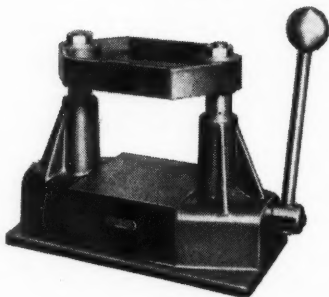


Woodworth manufactures a complete line of thread ring and thread plug as well as cylindrical plug and ring gages. Also produce special gages to customer blue-prints.

PRECISION PARTS



N. A. Woodworth engineering gives you plus value in precision parts. Production men with "know how" combined with well equipped plant are pace setters in aircraft engine and radar assembly fields.

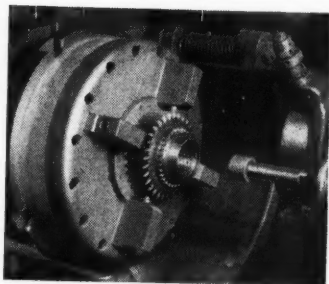


CONE-LOK JIGS

Woodworth Cone-Lok Jigs are noted for their mechanical simplicity and "life-time" construction.

DIAPHRAGM CHUCKS

Chucks engineered and built by Woodworth guarantees the ultimate in precision gear chucking.



ACCURACY YOU CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., 1300 EAST NINE MILE ROAD • DETROIT 20, MICHIGAN
COMPLETE LINE OF PRECISION GAGES • DIAPHRAGM CHUCKS • CONE-LOK JIGS

HEAT TREAT

SMALL PARTS, TOOLS & DIES

In Your Own Plant

- Install anywhere by simple wire connection. Quiet in operation. No fumes or odors—no ventilating required.
- Any intelligent man can operate furnace with automatic temperature control, using established procedures.
- Operating cost under 4¢ per hour to hold 1600° F. in Model 3 furnaces, with 2¢ per kw.-hr. rate. Others in proportion.

NOW YOU CAN heat treat, harden and temper small parts in your own plant . . . without experienced heat treaters. Economical to install and use, Cooley Electric Furnaces operate efficiently at high or low heats, and save your large furnace time for work requiring large volume capacity. Here are some profitable uses:

PRODUCTION HEAT TREATING of small parts . . . Small batches . . . Running pilot lots to pre-determine mass production techniques . . . Emergency repairs . . . Industrial and laboratory testing . . . Miscellaneous controlled heating jobs.



CHAMBER	8"W 6"H 14"L				10"W 6"H 18"L				8"W 6"H 14"L	
MAX. TEMP.	1850° F.				1850° F.				2000° F.	
AMPERES	14.8 at 230 v.				19.6 at 230 v.				20.2 at 230 v.	
WATTS	3400				4500				4650	
MODEL*	MH-3	VH-3	MK-3	VK-3	MH-4	VH-4	MK-4	VK-4	VK-5	VK-6
PRICE	200.00	230.00	250.00	280.00	295.00	325.00	345.00	375.00	420.00	340.00

* M models complete with hinged door and hearth plate.

V models have counterweighted vertical lift door.

K models include Selective Power Modifier for input control to correct temperature lag.

ACCESSORY EQUIPMENT

Electronic operated Veri-tron indicating and controlling pyrometer, with thermocouple and lead wire.....\$143.00
Same in self-contained, enclosed panel including line switch and fuses, with steel stand—completely wired..... 273.00
Steel stand with shelf..... 50.00

FORCED CIRCULATION AIR DRAW FURNACES — Write for data.

FREE LITERATURE

NEW CATALOG completely describes all models and applications for each. Write today for your copy . . . no obligation.



DEALERS AND DISTRIBUTORS WANTED!

Good territories open on this extensive line of self-contained small electric furnaces. Investigate now.

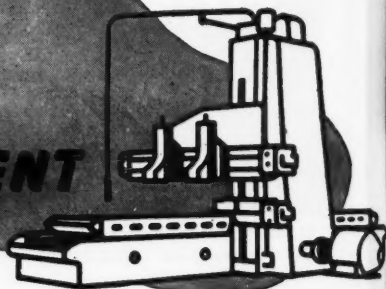
COOLEY ELECTRIC MANUFACTURING CORP.

34 South Shelby Street Indianapolis 7, Indiana

INDIANAPOLIS MACHINERY EXPORT CORP.

Export Manager, 44 Whitehall Street, New York, New York

NEW SHOP EQUIPMENT



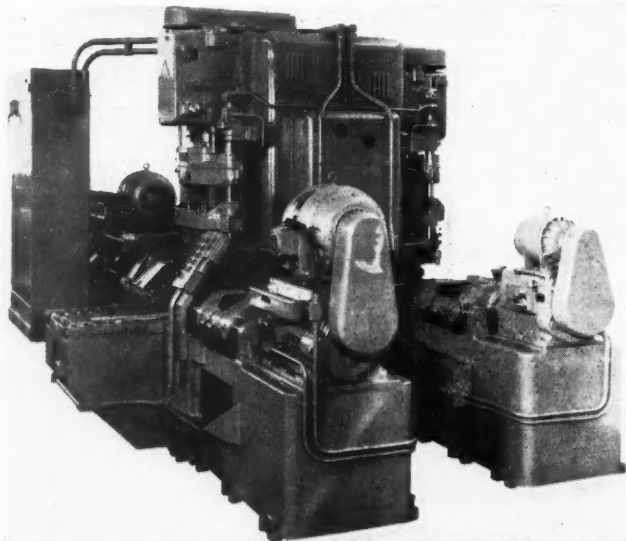
LeMaire 5-Station Line Processing Machine

For drilling the ends and top surface of a "V-8" automotive cylinder block, the LeMaire Tool & Mfg. Co., 2657 S. Telegraph Rd., Dearborn, Mich., has developed the 5-station 74-spindle line processing hydraulic feed type drilling machine shown herewith. The machine consists of a rigid fabricated center base, vertical straddle type column, and four end bases, two of which are mounted at either side of the main base. The center column has a No. 5000 twin ram unit mounted ver-

tically at station 2 and a No. 2000 twin ram unit mounted vertically at station 4. Each side end base at station 2 supports a No. 5000 twin ram unit, and the left side end base at station 4 supports a No. 5000 twin ram unit while the right side end base supports a No. 2000 unit. All units are equipped with multiple spindle drill heads with movable guide bushing plates mounted on two ample size guide bars.

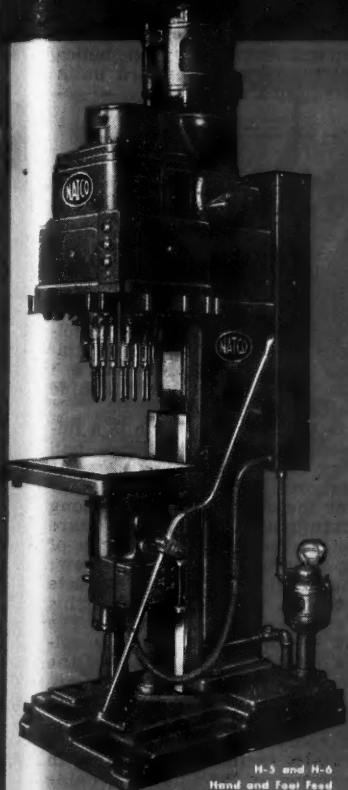
The cylinder blocks are passed through the machine from station to station on hardened steel rails by means of a hy-

draulically actuated traverse bar. Rough endwise location of the work is effected by means of hardened guide rails. Final location is achieved by guide pins entering reamed locating holes in the bottom surface of each block. These pins are hydraulically operated. Clamping of the work at stations 2 and 4 is accomplished by means of clamp fingers located on the vertical head and bushing plate guide rods which



LeMaire 5-Station
Line Processing
Machine

H-5 and H-6 High Speed Multi Drillers and Tappers



H-5 and H-6
Hand and Foot Feed

Available in Standard
or Heavy Duty Models
for work in small
or medium sized parts



* *In Cast Iron*



* *In Wood*



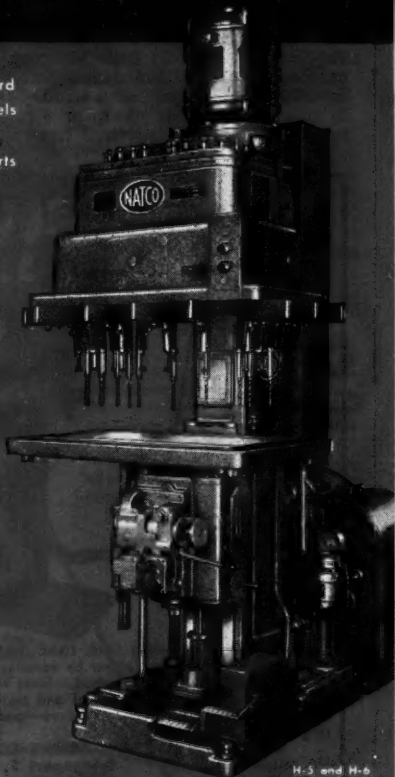
* *In Steel*



* *In Plastics*



* *In Aluminum*



H-5 and H-6
Hydraulic Feed

NATCO H-5 and H-6 Standard and Heavy Duty Multiple Spindle Drillers and Tappers make possible sensitive, high speed drilling and tapping in a wide range of materials at low cost. Features are the multiple spindle head, large working surface, quick change gears and speeds, vertical adjustment on spindles, and reversing motor drive. Available with hydraulic or hand and foot feed. Air operated rotary table available extra. Check details on these machines. Write for Bulletin 248.

NATCO DRILLING, BORING, TAPPING
AND FACING MACHINES

WRITE FOR ACTUAL PRODUCTION FIGURES ON THESE PARTS



NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind., U. S. A.
Branch Offices: 1809 Engineering Bldg. Chicago • 409 New Center Bldg.

Call a Natco Field Engineer

are moved down by hydraulic cylinders. The entire cycle of the machine, including transfer of work, raising or locating pins, clamping, drilling cycle, unclamping and withdrawal of locating pins, is automatically performed after the operator has placed a block in position and pressed the cycle button.

The sequence of operations performed on the machine are as follows: (station 1) load; (station 2) drill 10 holes (vertical head); drill 17 holes (left-hand head), drill 10 holes (right-hand head); (station 3) idle; (station 4) chamfer 6 holes and line ream 1 hole (vertical head), cham-

fer 13 holes, ream 6 holes, drill 1 hole, and counterbore 2 holes (right-hand head); (station 5) unload. The production rate of the machine is said to be approximately 63 blocks per hour.

Outstanding features of the LeMaire 5-Station Line Processing Machine include convenient chip unloading chutes; one electrical button for starting the automatic cycle; conveniently located control box for setup and emergency stop; helical gears on all heads and standard units; and high salvage value.



RIVETERS



• Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport 5, Conn.

Bowen-Beloit "Quadri-Trans" Face Grinder

Designated as the Bowen-Beloit "Quadri-Trans," a face grinder in sizes from 1 to 100 h.p. is now being produced by Bowen Grinders, Inc., 1607 Crescent Drive, Beloit, Wis. The machine consists essentially of an accurately ground column, a larger circular supporting member, a round and still larger flat bed plate, and a base where the machine rests on the bench or floor.

Centered in the hollow column is a micrometer feed screw fitted with a ball thrust bearing. A nut for this screw rests on a counterbored section in the hollow column. Over the column is fitted a long bearing, rectangular in length and square on its outer surfaces. A cap on top of this bearing is bored for the feed screw; however, the weight of the bearing rests on the ball thrust. To one surface of this outwardly square bearing is fitted the housing and spindle parallel to the column. To the opposite flat is attached the drive motor. The spindle and motor are connected by a V-belt drive. This construction provides a balanced unit of motor, master bearing, and spindle which is free to rotate, oscillate, or be held in any fixed position on the column. Moving

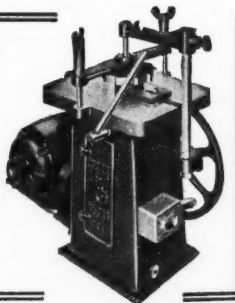
NO BUSHINGS, GUIDES or PILOTS NEEDED!

THE READING BROACH KEYSEATER

The Reading Bench Machine requires no bushings, guides or pilots. No other machine like it. Very fast—capacity from 1/8 to 3/4 cutter.

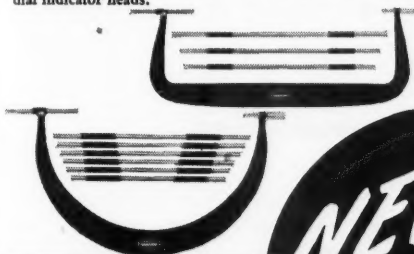
Low first cost—prompt delivery.

READING MACHINE COMPANY, Reading (Cincinnati), Ohio



TUBULAR MICROMETERS "C" and "U" Types

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TOOL MAKER'S HAMMER With Built-In Lens

A handy little hammer for spotting in layout work, light hammering, heading, etc. Built-in magnifier saves hunting and fumbling for glass. Offset head permits working in close quarters.



DIAL TEST INDICATOR No. 645—Heavy Duty

For severe applications around machinery or for continuous use in general tool work. Special spiral-type mechanism of unusually rugged construction for sensitive, accurate action. Dial reads 0-50-0 or can be furnished with 0-100 dial.



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An ideal precision-made gage for measuring paper, leather, sheet metal, wire, plastics, etc. Indispensable for inspectors, salesmen, buyers, stock clerks. Dial reads in thousandths, 0-100", range $\frac{3}{4}$ " with "rev" counter. Chrome plated case, all parts stainless steel, non-breakable crystal. Decimal equivalents on back.



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TOOLS**
by
Starrett

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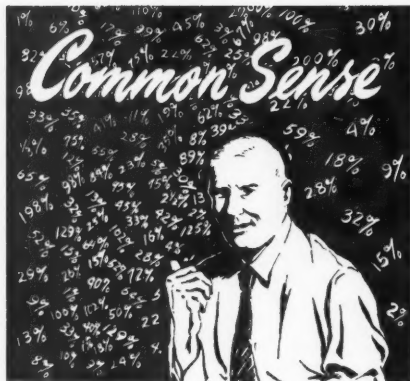
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COMMON SENSE calls for careful cutting fluid application, because there just isn't any "one shot" cutting fluid that can do a large percentage of all jobs! Consider the wide variety of speeds, feeds, materials, tolerance and finish requirements... variables that make it long-run economy to use the scientifically correct cutting fluid. It's plain common sense to call in cutting oil experts, people with a sound background of practical experience for recommending the right cutting fluid for the job.

—Chip

SOLVOL WATER MIXED CUTTING COMPOUND

Solvol is a unique super soluble emulsifiable cutting fluid with the extra metal cutting qualities that will help solve some of your machining problems. Ask for literature.

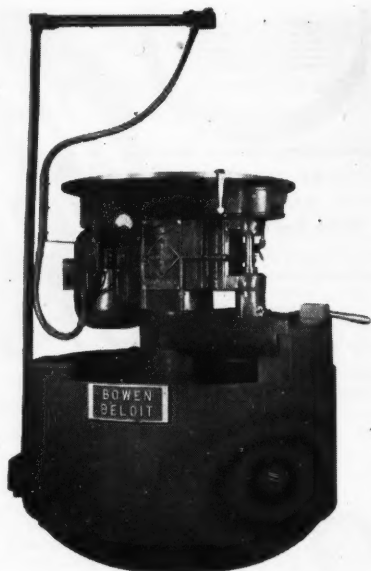
STUART service goes
with every barrel



2741 1/2 South Troy St., Chicago 23, Illinois

or stationary, the unit can be fed up and down by the feed screw at all times. The column serves as an accurate guide, with the height of the wheel controlled by the feed screw and the entire weight of the grinding head and its power supply supported by the ball thrust bearing on the feed screw at the center of balance.

With the arrangement described above, the compound movements of wheel in re-



Bowen-Beloit "Quadri-Trans" Face Grinder

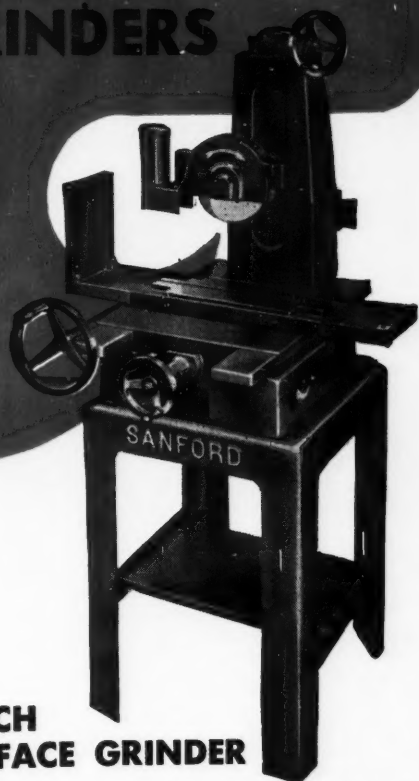
lation to work on the Bowen-Beloit Quadri-Trans Face Grinder are accomplished from a single massive large area slow-moving bearing which provides for four movements; namely, up, down, back, and forth. The bearing, which is located above the line of grinding, is shielded from abrasive dust or coolant by a close-fitting sleeve that extends well down over the round supporting member of the column. The sleeve is fastened to the master bearing and moves with it, thereby shielding the bearing and column. Adequate guards and splash brushes attached to the head are arranged to move completely away from the work and fixture for quick loading. A circular guard entirely surrounds the machine, thereby

SANFORD

SURFACE GRINDERS

Model MG

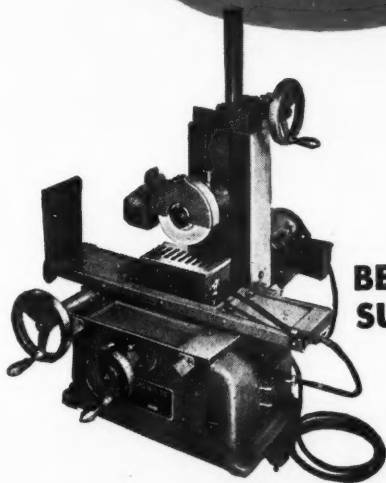
Handles many odd size tool room and production jobs, due to its capacity of 8" x 12" x 12". Actual movements — Transverse 8 $\frac{3}{4}$ " — Longitudinal 13" — Vertical 12" (under 7" wheel).



BENCH SURFACE GRINDER

Model SG

A sensitive, highly accurate machine specially designed "for the job that fits in your palm." Actual movements — Transverse 4" — Longitudinal 8" — Vertical 6" (under 4" wheel).



WRITE FOR COMPLETE DETAILS

SANFORD MANUFACTURING CO.
1021 COMMERCE AVENUE
UNION, NEW JERSEY



Cross Special Drilling and Reaming Machine

Cross Special Drilling and Reaming Machine

A unique special machine which is designed to process clusters of four parts cast in a single piece has been announced by the Cross Co., Detroit 7, Mich. A total of 150 sets or 600 individual valve rocker shaft brackets is said to be drilled and reamed hourly by a single operator. Ten holes are finished in each casting.

The machine includes a seven-station power-operated index table. Loading and unloading are accomplished at an independent station while the machine is cutting two clusters or four parts each in every one of the six working stations. Thus, 12 sets of 48 parts are machined at one time progressively. The feed is hydraulically controlled.

According to the manufacturer, maintenance of the machine is reduced to a minimum due to the many standardized parts, accessibility of wearing parts, and interchangeability of self-contained units. Flexibility for part design changes is provided by the use of standard Cross columns, heads, and index table.

permitting the fixture base to be used as a tank or catch basin from which the coolant is drained.

The Bowen-Beloit Quadri-Trans Face Grinder utilizes a radial moving ring type face grinding wheel with large fixture area underneath the wheel. To this simple construction and principle can be added power up-and-down feeds, power oscillation or rotation of the head, automatic cycles, automatic sizing, and other features to meet a wide variety of face grinding requirements.

LUERS

PATENTED CUTTING OFF TOOL HOLDERS PATENTED CUTTING OFF BLADES

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured by

J. MILTON LUERS, 12 Pine Street, Mt. Clemens, Mich.

Produced under License Issued by John Milton Luers Patents Inc.

YESTERDAY'S PIONEER . . . TODAY'S LEADER



Weldon

Double-End End Mills

IT'S THE TEETH THAT TELL

It's the "teeth" in Weldon End Mills that tell the story of more production and bigger profits on your jobs.

Weldon pioneered in producing *scientifically designed* teeth for end mills, a step over 25 years ago that opened the door to higher speeds, and faster feeds.

After lengthy experiment and study, the

tooth shape and spiral angle on Weldon End Mills were radically altered from conventional styles. The result was a tooth that *allows chips to curl out without clogging and insures better performance and longer life* for the tool.

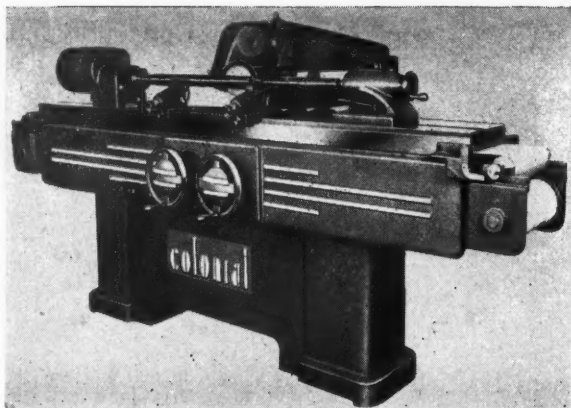
Call the Weldon representative for more information.

THE WELDON TOOL CO.

*Cleveland 4,
Ohio*



3000 WOODHILL ROAD



Colonial Broach Sharpener
for Round and Flat Broaches

Colonial Broach Sharpener

To meet varying broach sharpening requirements, the Colonial Broach Co., Box 37, Harper Station, Detroit 13, Mich., is introducing a broach sharpener in seven basic models. Two of the models are intended for sharpening flat broaches; three models are for sharpening round broaches; and the remaining

two models are designed to handle both flat and round broaches.

The models for sharpening flat broaches are designed to accommodate broaches up to 8 inches wide and up to 32 and 65 inches long respectively at one setting. The models for sharpening round broaches are said to accommodate broaches up to 6 inches in diameter and up to 36, 72, and 84 inches long respectively.

They are designed to handle all types of round broaches, including spline, serration, and other types. The two models for sharpening both flat and round broaches are constructed to handle round broaches up to 6 inches in diameter and up to 72 and 84 inches long respectively, and flat broaches up to 8 inches wide and 65 and 77 inches long respectively.

NICHOLSON *FAST-ACTING* 2-WAY VALVES

Save Muscle

IMPROVE PRESSURE CONTROL

Turning on or off instantly with 60° lever travel, Nicholson valves are widely used as replacements for gate or globe valves. Save time and labor, minimize the differential between opening and closing pressures. Six (6) metal combinations for all mediums.

CATALOG 546.

W. H. NICHOLSON & CO.

136 OREGON ST. WILKES-BARRE, PA.

Valves ★ Traps ★ Steam Specialties



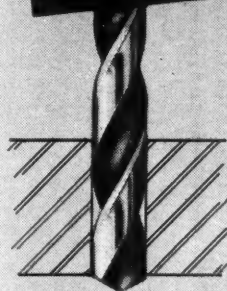
Above, lever models; press. to 5000 lbs. Left, foot model; press. to 300 lbs. Also a full line of 3 and 4-way cylinder control valves; $\frac{1}{8}$ " to $1\frac{1}{2}$ ".

THREADWELL TOOLS

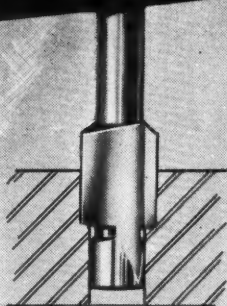
Form

Perfect Contours

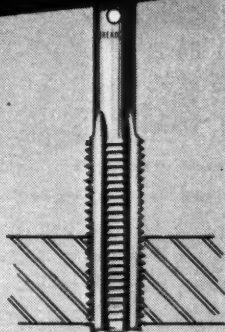
for SOCKET HEAD CAP SCREWS



**Threadwell Hi-Speed
Twist Drills**



**Threadwell Solid Hi-Speed
Two Lipped Counterbores**



**Threadwell Hi-Speed
Commercial Ground Taps**



The contour for this cap screw was made by a 17/32 drill and 25/32 counterbore 1/2 deep in the holding piece, and 27/64 drill and 1/2-13 NC tap in the held piece. Result: A perfect fastening job through the teamwork of Threadwell Tools.

TRY THREADWELL ON THE TOUGH ONES

Even the most exacting jobs can be started and finished with Threadwell's complete line of cutting tools. Each step of the operation can be done by the same high quality tools, assuring the same precise degree of accuracy for the whole job. You can't afford to overlook Threadwell Tools. Write for catalog now!

Threadwell

"TOOLS OF DISTINCTION"

NEW THREADWELL CATALOGS

THREADWELL TAP & DIE CO., GREENFIELD, MASS., U.S.A.

Gentlemen: Please send the following catalogs by return mail:

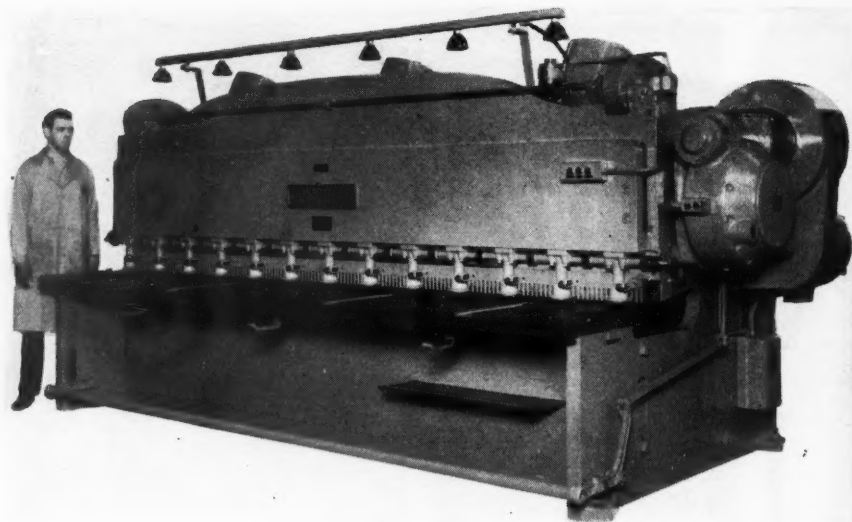
GENERAL CUTTING TOOLS ☐ DRILLS ☐ GAGES ☐

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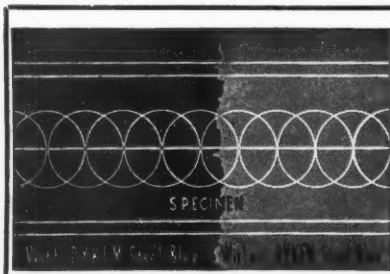
Cincinnati All-Steel Shear

An outstanding advantage claimed for the Colonial Broach Sharpener is the ease with which broaches can be sharpened by the operator. All controls of the machine, including start and stop buttons, table movement controls, and the controls for raising and lowering the grinding head on the flat broach models, are located in such a manner that they can be easily reached by the operator from one position in front of the machine. The grinding wheels and headstocks on all models are equipped with built-in motors. The spindles of the grinding wheels on all models have a standard speed of 4,000 r.p.m. which can be increased to a maximum of 10,000 r.p.m. through the use of special

pulleys. Headstocks on the models for sharpening round broaches, as well as on the universal models, have two-speed gearing for spindle speeds of 200 and 400 revolutions per minute.

Cincinnati All-Steel Shear

Product of the Cincinnati Shaper Co., Cincinnati 25, Ohio, the Cincinnati All-Steel Shear shown herewith has a capacity for $\frac{1}{4}$ -inch mild steel up to 12 feet long. The outstanding feature of the shear is the very low rake or shear angle to the upper knife which is claimed to ensure the production of a sheared strip



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench, ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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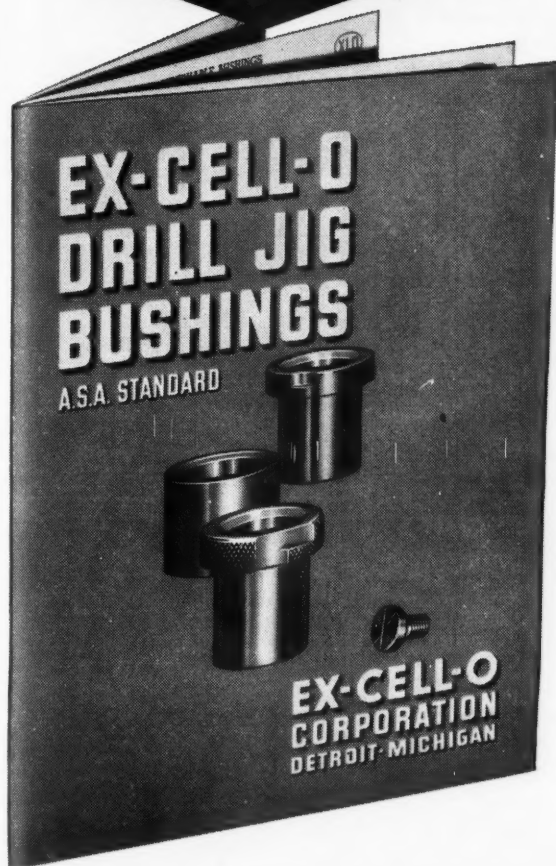
THE DYKEM COMPANY

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ST. LOUIS, MO.

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GET THE FACTS ON



Ex-Cell-O is a pioneer in the manufacture of drill jig bushings to close hole limits. Naturally, these closer limits make possible longer tool life and greater accuracy. Ex-Cell-O, noted as headquarters for precision-made bushings, carries one of the largest and most varied stocks of drill jig bushings available in the world. A.S.A. Standard bushings can be obtained directly from Ex-Cell-O's Detroit and New York offices and from the Machinery Sales Company in Los Angeles. Send for Ex-Cell-O Catalog No. 11882, giving standard bushing sizes.



48—40

EX-CELL-O CORPORATION
DETROIT 32 • MICHIGAN

with a minimum of twist, bow, or camber. The machine is said to be capable of shearing 10 gauge strips $\frac{1}{4}$ -inch wide by 10 feet long without any twisting of the material.

Another interesting feature of the machine is a light beam shearing gauge. Unusually high limit intensity is provided through the use of General Electric projector floor lamps. High intensity table lighting is also provided. The light beam shearing gauge is said to be particularly useful when shearing to a scribed line in the production of gussets and other irregular shapes.

PEERLESS

Abrasive Belt Surfacers



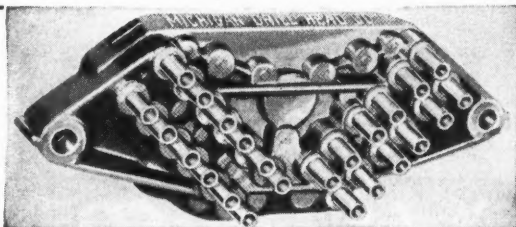
Speed and quality are the results of grinding flat surfaces of metal, hard rubber, celluloid, and plastics on the PEERLESS ABRASIVE BELT SURFACER. Made in sizes of 9", 14" and 20". Vertical and Horizontal Types. Write for illustrated pamphlet.

PRODUCTION MACHINE CO.
GREENFIELD, MASS.

Pictured: a 24-Spindle Heavy-Duty Drill Head.

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MANUFACTURERS
OF MULTIPLE DRILL-
ING EQUIPMENT.**

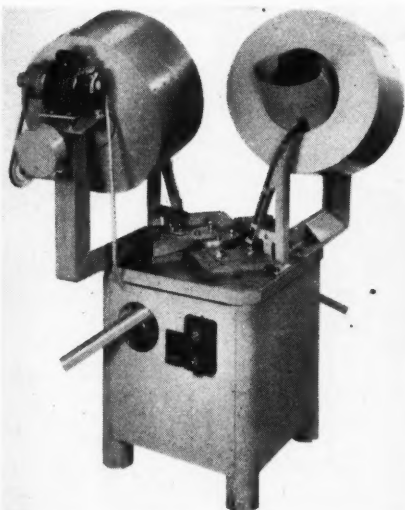
We Invite Your Inquiry.



MICHIGAN DRILL HEAD CO. 971 E. 8-Mile Road, Hazel Park, Mich.

Prutton "Rollmaster" Rotary Thread Rolling Machine

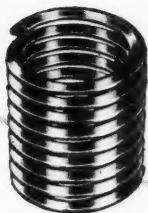
A rotary thread rolling machine designated as the "Rollmaster" is announced by the D. H. Prutton Machinery & Tool



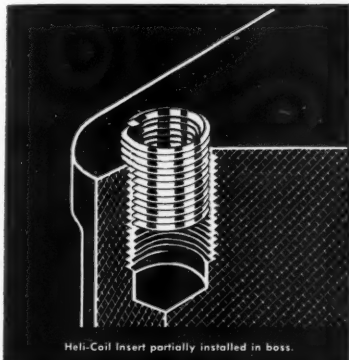
Prutton "Rollmaster" Rotary Thread Rolling Machine

Co., 5295 W. 130th St., Cleveland, Ohio. According to the manufacturer, bolts and studs of various descriptions up to $\frac{1}{4}$ inch in diameter can be threaded, ribbed, knurled, marked, necked, or otherwise machined at a rate of between 15,000 and 20,000 pieces per hour with the unit.

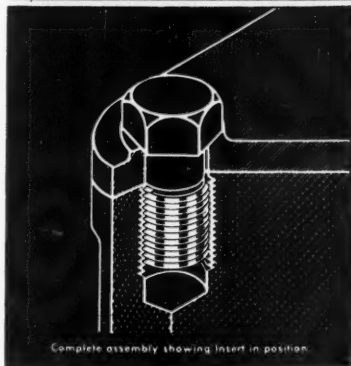
Small and sturdily constructed, the Rollmaster can be readily adapted to the user's own rolling requirements.



This Ounce of prevention prevents tons of thread failures!



Heli-Coil Insert partially installed in boss.



Complete assembly showing Insert in position.

● Heli-Coil* Screw Thread Inserts provide a strong, durable tapped thread surface for assemblies in light metal, iron, steel and other metal castings, forgings and machined parts. They are also gaining extensive usage in plastics, wood and similar structural materials.

Designed into a product as original equipment, the use of Heli-Coil Inserts prevents many a headache for both manufacturer and customer, due to damaged or stripped tapped threads. They also provide a simple solution to the difficult problem of replacing stripped and oversize threads in production, salvage and maintenance operations.

Heli-Coil Inserts are precisely engineered helical coils of stainless steel wire. Installed in tapped threads of all standard profiles, they fit accurately and provide a hard, smooth, tough lining between tapped thread and screw. They strongly resist wear, abrasion, welding and stripping.



*Reg. U. S. Pat. Off.

Engineering representatives are available for advice in the application and use of Heli-Coil Inserts. Send for Bulletin #148, describing typical applications, or Bulletin #248, containing design and installation data.



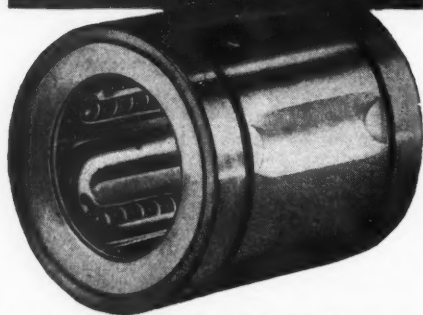
HELI-COIL CORPORATION

Formerly AIRCRAFT SCREW PRODUCTS COMPANY, Inc.

47-230 35th STREET, LONG ISLAND CITY 1, N. Y.

At last!!

A BALL BEARING FOR YOUR LINEAR MOTIONS



BALL BUSHINGS

Sliding linear motions are nearly always troublesome. Unlimited travel BALL BUSHINGS can be used to tremendous advantage on guide rods, guide posts, reciprocating shafts and for support of any mechanism that is moved or shifted in a straight line.

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ELIMINATE BINDING and CHATTER
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LOW FRICTION and WEAR
LONG LIFE — LOW MAINTENANCE
SOLVES SLIDING LUBRICATION PROBLEMS**

Now available for $\frac{1}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1"
shaft diameters. Additional sizes to follow.

Write for literature and name of our representative in your city. No obligation, of course.

THOMSON INDUSTRIES, INC.

DEPT. D, MANHASSET, N. Y.

PLANTS: Mineola, Long Island... Lancaster, Pa.

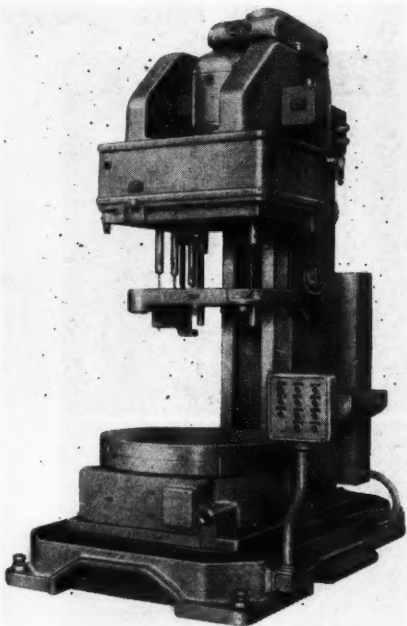
FRICTION COSTS MONEY

ROLL IT

DON'T SLIDE IT

Natco "Holesteel" Model C Type A Drilling and Tapping Machine

Designated as the Natco "Holesteel" Model C Type A, a vertical type production machine tool adaptable for drilling, boring, tapping and like operations on high production as well as general miscellaneous work is announced by The National Automatic Tool Co., Inc., Dept.



Natco "Holesteel" C2A Drilling and
Tapping Machine

27, Richmond, Ind. The electrically controlled hydraulic feed system of the machine provides for an infinitely variable feed selection within the specified range. Where provided, change gears permit spindle speed variations. Electrical push-button control provides for routine and set-up control from a central station.

The machine is available in three models, designated as the C2A, C3A, and C4A, which are of both single spindle and fixed center multiple spindle construction. Each model can be supplied with either a large or small base. The small area base is supplied for adjust-

**THEY MAY
LOOK ALIKE . . .**

but there's a difference!



Both gowns look alike to the camera's eye, but one is an original creation . . . the other a clever copy. By actual comparison a vast difference in quality and value is evident to the keen eye of the expert.



THERE IS A DIFFERENCE IN TAPS, TOO!

They may look alike at first glance, but the careful workmanship in BATH ground thread taps is easily detected by the experienced craftsman. Vital manufacturing intangibles too — such as quality control and pride in the product — consistently maintain this high Bath standard. Right from the start BATH stock and special taps are planned for uniformity and accuracy — they're ground from the solid AFTER hardening.

In your plant, this means greater speed, more holes per tap, longer runs between sharpenings, improved accuracy and cleaner threads — assuring holes consistently within gaging limits.

You'll find BATH commercial and precision taps for any regular job . . . and experienced BATH engineers to help you with unusual threading problems. Insist on BATH taps . . . profit by their plus-performance!

GROUND THREAD
TAPS

PLUG AND RING
THREAD GAGES

INTERNAL
MICROMETERS

JOHN BATH CO. INCORPORATED

20 Grafton St., Worcester, Mass.



able table applications or for stationary fixtures mounted on the base. The larger area base is suitable for rotating and sliding type fixture applications. Across the front and along either side of the working area is a wide and deep coolant channel which drains into the coolant reservoir within the rear section of the base.

The Models C2A and C3A can each be supplied with an adjustable knee type table. The working area of the table is surrounded by a wide coolant channel which drains to the machine base. The knee supporting the table top has long bearings on the ways of the column. The

entire assembly has a vertical adjustment of approximately 12 inches through a crank-operated elevation screw.

Each model features a heavy box section column which is said to prevent deflection under the heavy thrust loads encountered. The ways are of close grain, high tensile cast iron. The upper section of the equipment forms a compartment, enclosing the hydraulic pressure pump and all of the hydraulic system piping. The hydraulic feed control panel is located on the right side of this compartment, while on the left is located an inspection cover and protected oil filler opening. The lower section encloses the

head counter-balancing weight. Additional auxiliary counterweights may be added through an opening in the column rear wall. Column height extensions of 12 and 24 inches can be furnished on order. The neck incorporates the anti-friction mounted counterweight chain sprockets.

Mounted on an adjustable leaf at the rear, a standard foot mounted motor drives the hydraulic pump through V-belts. The hydraulic pump is mounted on the underside of the neck with the hydraulic reservoir, and is flexibly coupled to the drive shaft.

The head slide for mounting the spindle heads is guided on the column ways and is provided with gib adjustment. The ways are automatically lubricated at each cycle of the head. The single spindle head is direct motor driven and anti-friction mounted. Sliding gears which are lever operated al-

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- MATERIALS
- MAN-HOURS
- MONEY

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RIGHT RIVETS

Select exactly the right semi-tubular split rivet, or cold-headed fastener from Milford's complete line. You'll find it pays in every way!

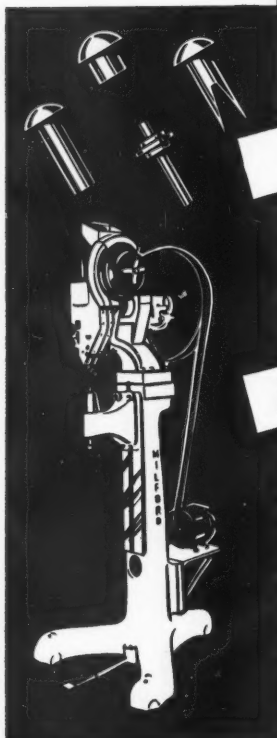
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Then use the right rivet setting machine for your application. One of Milford's 15 basic machines is sure to solve your particular problem . . . and slash your production costs!

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& MACHINE COMPANY

MILFORD, CONNECTICUT



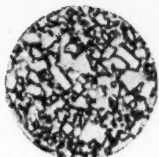
Better Performance

... because of

*Better Structure**

This Kennametal Style 11H90 Tool turns five of these semi-steel cast-iron cylinder liners compared to one with the carbide tool formerly used

It takes a hard, strong, sound tool material to remove 4,500 cubic inches of metal from five of these semi-steel cast-iron cylinder liners before regrinding—and then to repeat the performance after each resharp-ening, over the entire life of the tool.



* Consistent soundness and uniformity of structure characterize all Kennametal compositions, as illustrated in the micrograph above (1500 times enlargement). Note absence of large grains, and virtual freedom from porosity.

All Kennametal compositions are much harder than the hardest tool steel, and the uniformity of hardness and strength of each grade comes from a consistently sound physical structure which is produced by distinctive processing, and precise, scientific methods of control.

The proof of the pudding is in the eating—service results prove that a carbide which gives superior service is that having uniform grain structure, and therefore consistently maintained hardness, strength, and wear-resistance. That's Kennametal.

Equally important in cutting machining costs are Kennametal developments in mechanically-held tooling which further extend the profitable use and low-cost maintenance of carbide tooling.

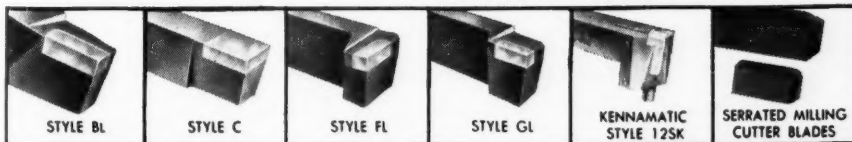
Kennametal tooling is completely-proved—can save money on 90% of your routine and unusual jobs. Ask our district engineer to demonstrate.



KENNAMETAL Inc.

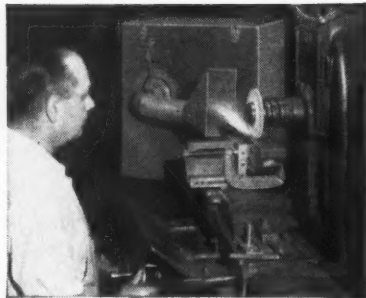
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■ Keep machines and workers free of costly, abrasive dusts. Stop worker's complaints. The portable, self-contained DUSTKOP can be placed beside any machine* and relocated later. Can usually be in operation 20 minutes after uncrating. Easily connected with metal hose or pipe. With a cyclone separator and spun glass filter, a direct-driven, self-clearing fan, DUSTKOP has the high suction capacity to give you TOP PERFORMANCE.

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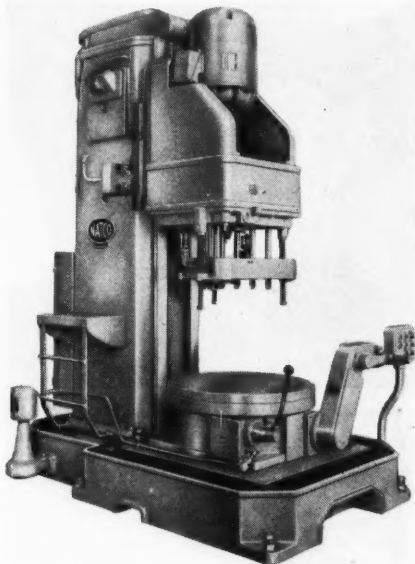
- ☐ DUCTLESS installation
- ☐ Operates only when needed
- ☐ Low maintenance
- ☐ Firesafe construction

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low for a selection of seven spindle speeds within the range selected through splined pick-off gears. The gears and bearings are lubricated through a cascade system. The ball bearing mounted spindle is of standard construction, and the nose is provided with a Morse taper, driving key, and drift slot.

Designed for individual requirements, the fixed center multi-spindle head is anti-friction mounted where center distances will permit. A cascade lubrication



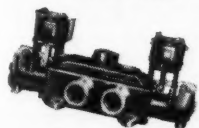
Natco "Holesteel" C3A Drilling and Tapping Machine

system provides adequate lubrication for all bearings and gearing. Combination drilling and tapping heads are provided with an independent reversing type motor for the tapping spindle drives.

A head traverse power cylinder is mounted between the ways at the top of the column and, through a control system, provides a cycle sequence of rapid advance, coarse feed, fine feed, rapid reverse, and stop. The control panel includes directional control, feed rate control, pressure gage, pump relief valves for pressure control, and solenoids for electrical remote control. Gasket mounting permits installations with piping con-

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Provide Dual Pressure — Solenoid Controlled



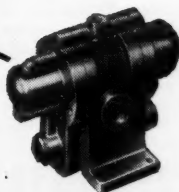
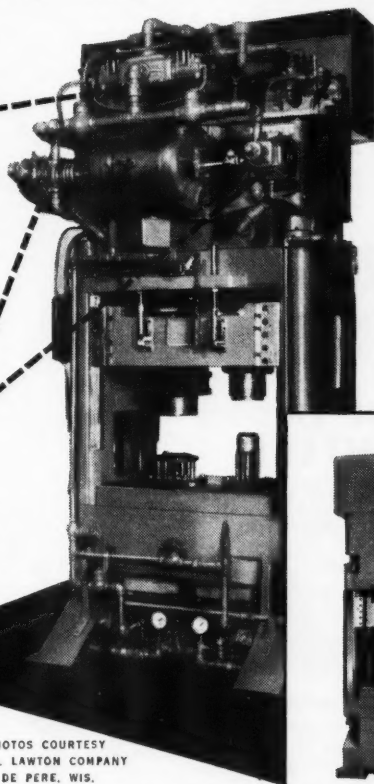
RACINE 4-WAY VALVE

Dual Solenoid pilot operated control valve — 2 or 3 positions. Available in sizes $\frac{3}{8}$ " to $1\frac{1}{2}$ " I.P.S., for electrical, hydraulic, mechanical or manual control.



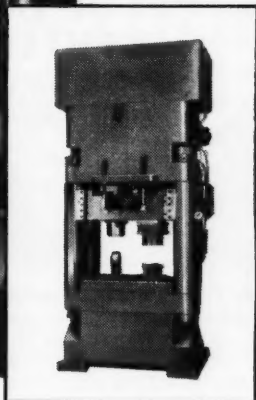
RACINE VARIABLE VOLUME PUMPS

Pressure up to 1000 lbs. p.s.i. Featuring Variable Volume with automatic constant pressure control. Capacities to 30 g.p.m.



RACINE HYDRAULIC PRESSURE BOOSTER

Converts low pressure input into high pressure output. Various ratios to 7 to 1. Saves horsepower in two pressure systems.



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This modern Lawton twin cushioned two die press operates through two RACINE Variable Volume Pumps and a RACINE Pressure Booster, controlled by a RACINE solenoid operated 4-way valve. High volume for the approach stroke, high pressure for the final closing action of the press, smoothly and positively applied, insure a clean steady drawing action. Your problems in the application of hydraulic force are given prompt and efficient consideration at Racine. Competent engineers are available in factory and field to develop hydraulic circuits that add to the design advantage of your product and the productiveness of your shop equipment. Get full data today. Write for catalog P-10-C. RACINE TOOL AND MACHINE COMPANY, 1770 State Street, Racine, Wis.



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cealed within the machine and allows for easy maintenance.

A delayed reverse available as extra equipment provides a dwell at the end of the feeding stroke and is used for accurate facing-to-depth operations. A step drilling attachment also available as extra equipment allows for the drilling of deep holes by increments of depth with a completely automatic cycle. A remote control for set-up can likewise be furnished as extra equipment. This control provides full remote control, through push buttons, for all phases of the cycle—rapid advance, coarse feed, fine feed, and rapid reverse. In connec-

tion with the set-up control, a centralized control is used for routine production cycling.

A motor driven centrifugal coolant pump mounted on the left rear of the base provides coolant when required. In production operations, the flow of coolant is automatically stopped except during cycling time. An independent shut off is provided through an electrical switch.

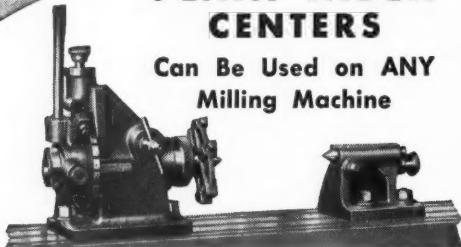
The standard equipment of the Natco Holesteel Model C Type A consists of two enclosed fan cooled foot mounted, ball bearing motors; one disconnect switch; one motor starter; one dustproof

control cabinet mounted on the rear of the column; and one push-button control station, including motor control and traverse control.

CUT MILLING COSTS *with* KEMPSMITH STANDARD ATTACHMENTS

PLAIN INDEX CENTERS

Can Be Used on ANY
Milling Machine

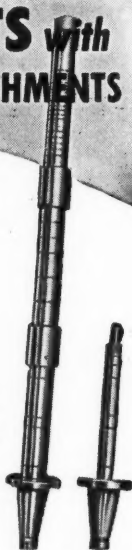


Kemp Smith Plain Index Centers for production and general indexing . . . simplify job set-ups . . . relieve the operator of the necessity of counting or making any calculations. Indispensable in milling taps, reamers, small gears, sprocket wheels, special grooving, etc. Described in Bulletin No. 124.

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ARBORS**

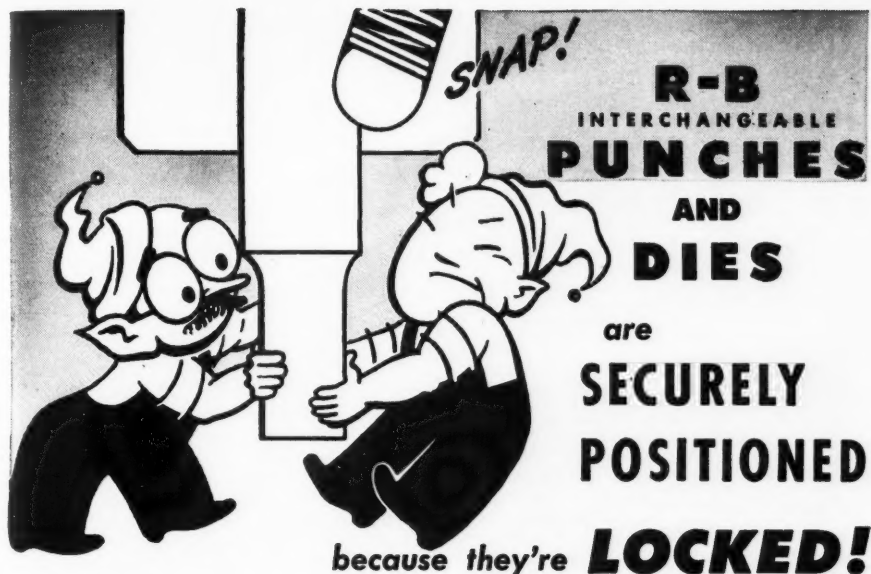
in all popular sizes or types. Adaptable to ANY make of milling machine with standardized spindle.

Link-Belt "PA" Oscillator

For the economical handling of a wide variety of materials in a horizontal path, the Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill., has developed the Link-Belt "PA" Oscillator shown here-with. The unit is described as a positive-action, roller bearing, eccentric type oscillating trough feeder-conveyor driven by a Link Belt Electro-fluid drive through a chain or V-belt reduction to the eccentric shaft and connecting rod assembly of the machine. It is available in standard trough widths of 12 to 48 inches to suit the capacity desired and character of the material to be handled, and in single

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Once inserted . . . a simple matter of a push and a twist . . . R-B punches and dies stay in place, accurately positioned both vertically and radially for perfect alignment with the mate. Spring-held ball bearing locks in R-B retainers prevent *all* movement of punches and dies until released.

Because R-B products are made from selected steels with closely controlled hardness, finish and tolerance, they are all uniform and interchangeable. R-B interchangeability also lowers punch and die inventories and enables press operators to make quick changes so that press "down time" is kept at a minimum. These R-B advantages, fully proved by years of varied production use, are a few of the reasons why R-B punches and dies are now "standard" in the metal-working and plastics industries.

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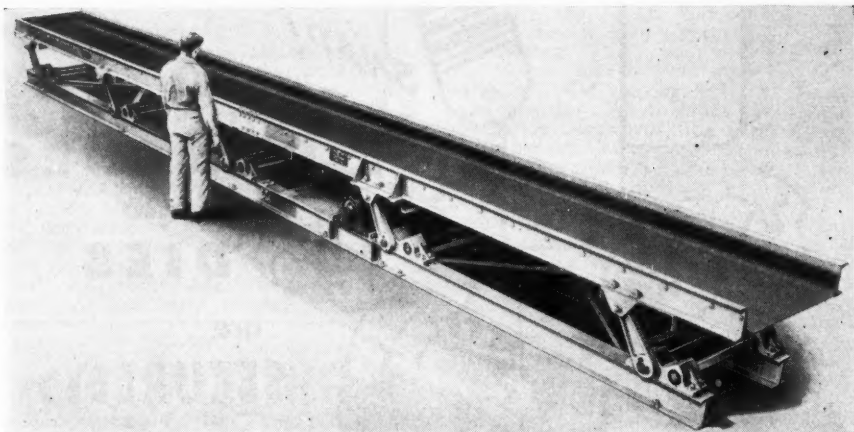
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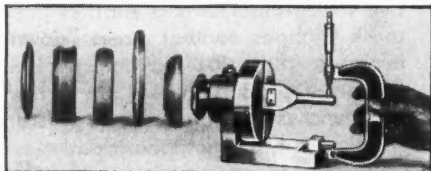
Link-Belt "PA" Oscillator

trough lengths of up to 100 feet. For longer carrying runs, two or more units may be arranged in series, one discharging into the other and each equipped with an individual motor drive.

Besides conveying material, the PA Oscillator may also serve as a cooler, dryer, or conditioning unit when jacketed, louvered, or otherwise constructed for the service intended. The trough is

TALLMAN RADIUS EMERY WHEEL DRESSER

Concave radii
dressed up
to $2\frac{1}{2}$ "



Convex radii
dressed up
to $1\frac{3}{8}$ "

To dress a .250" concave radius raise diamond holder .250" above center. Lower diamond holder .250" below center for .250" convex radius. Pass diamond across face of wheel by rotating spindle with hand wheel, running wheel away from spindle.

An inexpensive dresser for precision performance.

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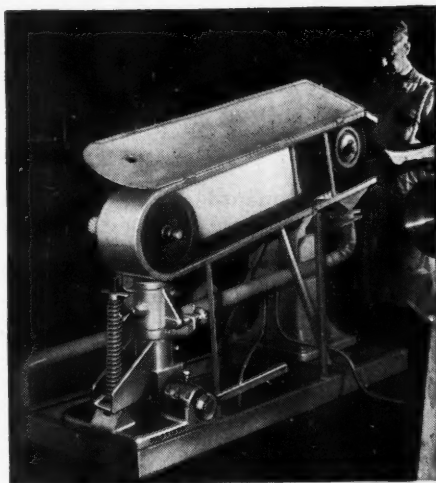


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Many manufacturers have definitely determined the greater efficiency and economy of using abrasive belts over set up wheels. There are fewer rejections due to mild scratches, uniform results, less chance of burning or discoloring, lower polishing cost per piece, as a result of increased production. THE MATTISON ABRASIVE BELT BACKSTAND IDLER enables you to take advantage of this method at a very small investment. You use your present lathe and set the Backstand Idler in the rear. For complete information send for our new free circular giving complete details.



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either a pan type or constructed with channel steel sides. The standard trough is leakproof and can be furnished with dust-tight covers or constructed for air and gas-tight movement of the material. The conveyor trough can also be fabricated of corrosion and heat resistant metals.

The trough is supported on a series of short arms and adjustable torsion bars having the effect of reactor springs. These springs absorb the energy of trough movement at each end of the stroke, at all points of support throughout the length of the trough. The torsion bars and supporting arms are assembled

in pairs in common bases or mounts on an H-beam sub-frame, with each arm supporting one side of the trough. Each torsion bar is fixed at one end and is free to articulate in a steel-backed rubber bushing on the other end, on which the trough-supporting arm is mounted and keyed. The fixed end can be adjusted by means of set screws acting upon a self-energizing clamp which holds the bar.

According to the manufacturer, the Link-Belt Electrofluid Drive accelerates the PA Oscillator smoothly yet rapidly and requires a motor of minimum horsepower, based on the normal power requirement when operating under full load.

The self-contained H-beam sub-frame on which the drive and trough-supporting arms are mounted may be supported on springs where firm foundations are not available for the installation.

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0.004" TO 5/16" IN ALL DRILLABLE MATERIALS?

AND ON FAST PRODUCTION SCHEDULES?

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Investigate its many exclusive features. Our Bulletin V-47 gives complete information. Write for it today!

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Bertsch Roll-Coating Machine

The development of a roll-coating machine for the application of drawing compound to various metals prior to forming and deep drawing is now being marketed by the Bertsch Machinery Co., Dept. D, 2832 E. Grand Blvd., Detroit 11, Mich. According to the manufacturer, the machine assures a uniform and economical application of compound to either one or both sides of the blank simultaneously prior to insertion in the die cavity.

Drawing compound may be applied in any desired quantity through the use of a con-

Should your **AIR-POWER** system be **CENTRALIZED**

If you have a shop where you need Air Power at scattered or isolated spots, your first impulse may be to install a decentralized source of Air Power... a small compressor at each location. But before doing this, consider these points:

Flexibility

Power Rate
First Cost
Installation

Load Factor

Piping System
Attendance
Maintenance

For example, during certain hours, seasons, or cycles, the maximum demand for air may shift from one part of your plant to another. If you had a central compressor plant with an adequate piping system, the full capacity of your entire plant could be made available to *any* section of the shop at *any* time. You may find that part of shop should have a centralized system, the other decentralized, or a combination of both systems.

or
DECENTRALIZED?

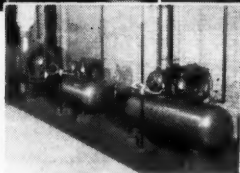
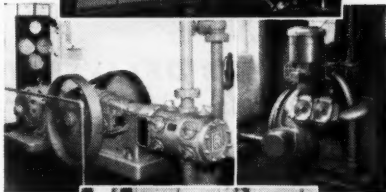
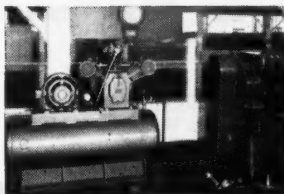
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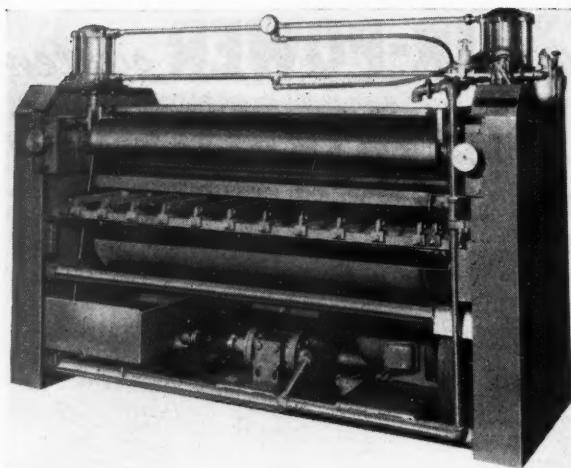
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Bertsch Roll-Coating Machine

applied with the machine, including lard and wool fat in mineral oil, graphitized compounds, water soluble compounds of soap borax and sulphonated oils, and plastic compounds for immediate use and for delayed stamping operations. Sheets up to $\frac{1}{4}$ inch thick and of any length may be coated on the machine in widths ranging from 24 to 72 inches.

Hufford Model 2-C Hydraulic Press

trolled spreading roll. Thickness requirements vary from a very thin spread for drawing compounds with a plastic base to a more generous application of the water soluble and soap borax types. Almost all types of compounds may be

A two-column hydraulic press is now being offered in capacities of from 10 to 200 tons by the Hufford Machine Works, Inc., Redondo Beach, Calif. Designated as the Model 2-C, the machine includes features which permit the variation of

RUGGED

Gosh, Yes!

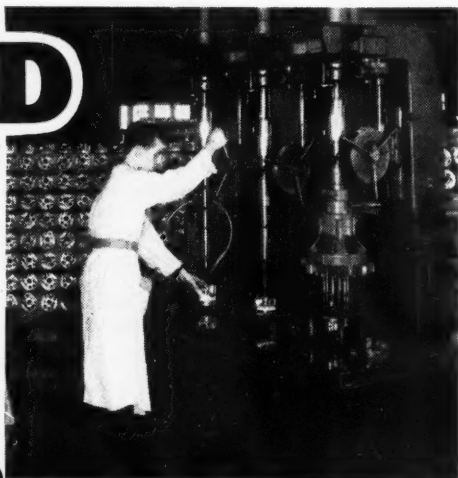
ASSOCIATED AIRCRAFT TOOL & MFG. CO., Hamilton, O., found that U. S. Drill Head's standard adjustable multiple spindle drill heads stood the gaff—and are still going strong after drilling 600,000 holes.

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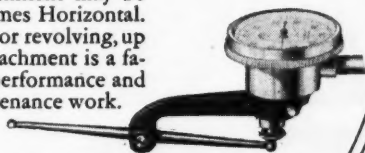
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A Universal or Hole attachment may be clamped to the stem of the Ames Horizontal. It will check holes, stationary or revolving, up to $1\frac{3}{4}$ " deep. This Ames attachment is a favorite for speeding up the performance and accuracy of service and maintenance work.



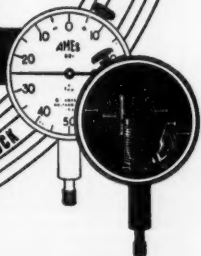
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Waltham 347 Mass., U.S.A.

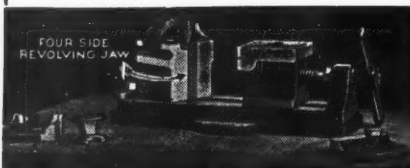
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FORGED BRASS CASE AND STEM • HARDENED STEEL GUIDE PIN AND BLOCK



IT OFFSETS HIGH WAGES

You will eliminate from your payroll, many hours of highly-paid Machinists' time if you have these men use the JACKSON TIME-SAVING VISE. It cuts out the time they are forced to waste hunting for Bolts, Clamps, Angle Plates, Parallel Strips, etc., when "rigging up" work on the Drill Press, Miller, etc. Furthermore, you can eliminate the simultaneous loss of output and overhead expense incidental to having your productive machine idle during the "rigging up" process. The four-side turret jaw and supplementary jaws enable the Vise to hold quickly, THE THOUSAND AND ONE SHAPES that arise annually in Machine Shop work. SEND FOR BULLETIN No. 23-M.



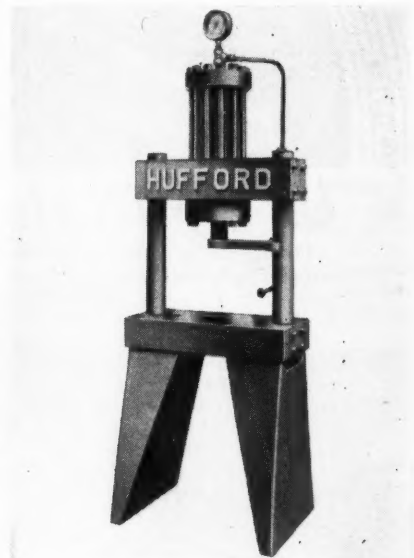
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120 N. THIRD ST. READING, PA.

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both daylight and column spacing from standard specifications with a minimum amount of engineering and machining. In this manner, the press can be readily converted to a wide range of operations in the metal, plastics, ceramics, chemical and powder compaction industries.

The Model 2-C is equipped for manual operation but can be easily converted to semi-automatic or completely automatic operation with the addition of standard Hufford accessories. Either single or multiple ram action can be obtained for op-



Hufford Model 2-C Hydraulic Press

posed pressing, ejection, die charging, off-bearing, and so on. Automatic timing in any desired sequence of operations is produced by means of a Hufford Mechanical "Brain."

Optional construction features for the Hufford Model 2-C Hydraulic Press include moving and guided platens attached to the ram, rotating tool facilities, variable work clearance (either vertical or horizontal), and optional table height. Hydraulic power units for use with the Model 2-C are said to develop pressures and volumes for ram speeds up to 700 inches per minute and pressures up to 200 tons.

Precision ROD CUTTING at High Speed



with the New
**DI-ACRO
ROD PARTER**

This newest member of the DI-ACRO family of "DIE-LESS DUPLICATING" Machines brings you accuracy, speed, capacity range and ease of operation fully up to the standards established by DI-ACRO Precision Benders, Brakes, Shears.

Do you require precision?—The DI-ACRO Rod Parter holds tolerance to .001" on duplicated cuts. The ends are square, and roundness is maintained.

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Shows parts produced without die expense or delay by DI-ACRO Benders, Brakes, Shears, Rod Parters, Notchers, Punches. Send for your free copy.

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All hot and cold rolled rods

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Copper

Brass

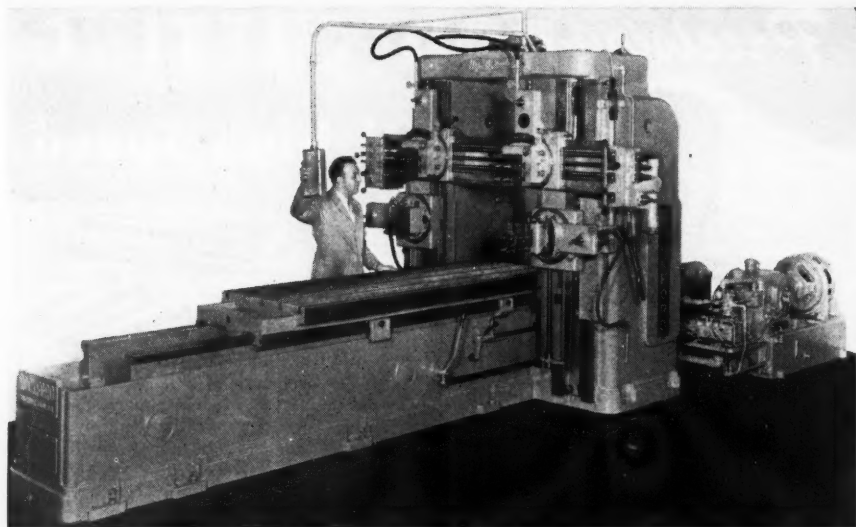
Aluminum

Bi-metals

Many types of plastics

Fibre Rubber Wood





Rockford Double Housing Hy-Draulic
Shaper-Planer

Rockford Double Housing Hy- Draulic Shaper-Planer

As an addition to its line of Hy-Draulic machine tools, the Rockford Machine Tool Co., Rockford, Ill., announces a double housing shaper-planer which utilizes hydraulic pressure for the feeds as well as the table drive. Designed to meet the need for a fast, small size planer to handle the production of heavy duty "in between" work that is too small for economically machining on a standard planer yet too large for a shaper, the machine is built in three sizes of 24 x 24, 30 x 30, and 36 x 36 inches with stroke

lengths of 6, 8, 10, and 12 feet.

The bed, columns, and rail of the Rockford Double Housing Hy-Draulic Shaper-Planer are of heavy cross section to provide for maximum rigidity under all working conditions. The two rugged columns are designed to afford rigid support to the crossrail tool heads for maximum efficiency in performing heavy duty work. In addition, the machine features dual controls for the rail head and table and can be supplied with two tool heads with automatic tool lifters for the crossrail and two side heads with automatic tool lifters, the second crossrail head and side heads being extras.



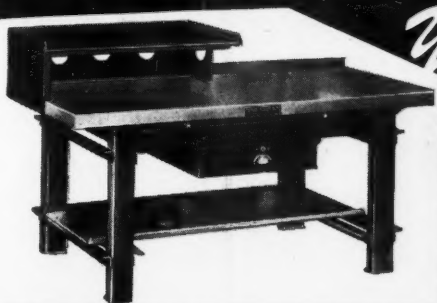
STOP Oily Floor Mishaps
with FULLER'S EARTH

Avoid costly accidents caused by slipping on oily or greasy floors! Reduce fire hazards! Replace sawdust or wood shavings with Fuller's Earth. Every shop needs this low-priced safety aid. Fuller's Earth *absorbs* oil and grease—and it's non-inflammable. Write for FREE SAMPLE or trial order at quantity price.

TAMMS

Dept. RM-9, TAMMS SILICA CO., 228 N. La Salle Street, Chicago 1

PRECISION BUILT!



Yes, **CHALLENGE**
WORK BENCHES
are Precision Built.
They are not of the
Hammer-and-Saw Variety

Accurate work requires an *always smooth, level, unyielding* Work Bench. A Challenge Bench gives you all this.

- The rugged, two inch, cast iron top is carefully machined on top and on *all four* edges at right angles. You can depend on their accuracy.
- The top is supported on sturdy steel channel legs welded into a rigid framework by cross angles. The long channel supports are provided with lock leveling screws by which the top can be kept perfectly level at all times. The lower braces are high enough above floor to permit moving by standard lift truck.
- Tool box shelf at one corner gives added capacity as do the steel drawer and full length shelf below top. Drawer has pilfer-proof lock.
- Built in four standard sizes 28 inches wide and 48, 60, 72, and 84 inches long in three styles (1) complete as illustrated, (2) with tool box shelf and without drawer, or (3) without tool box shelf or drawer

WRITE for Complete Catalog of Challenge Precision Equipment. Including Layout Surface Plates, Bench Plates, Lapping Plates, Straight Edges, Parallels, V-Blocks, Right Angle Irons and Angle Plates.

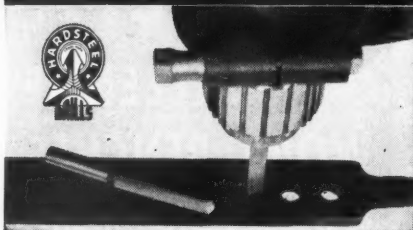
256



THE CHALLENGE MACHINERY CO.

GRAND HAVEN, MICHIGAN, U.S.A.

Drill Hardened Steels without Annealing with "HARDSTEEL"



Don't let anyone tell you that hardened steels must be annealed before drilling, countersinking, counterboring or reaming.

With "HARDSTEEL" drills you can produce accurate, smooth holes in steels hardened by any process—oil-hardened, water hardened, cyanided, nitrided, and they work equally well on work-hardening steels and high carbon-high chrome steels of any degree of hardness.

"HARDSTEEL" drills used with standard drill presses cut costs in production shops because parts drilled after hardening always match at assembly. In service shops they save time and material and permit engineering changes calling for additional drilling to be made after parts are full hardened.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are now functioning in thousands of plants in parts recovery operations.

**You Harden It — We'll Drill It —
with "HARDSTEEL"**

**"HARDSTEEL" Tool bits make
faster, deeper cuts on steels
and non-ferrous alloys.**

BLACK DRILL CO., Division Black Industries
1372 East 222nd Street + Cleveland 17, Ohio

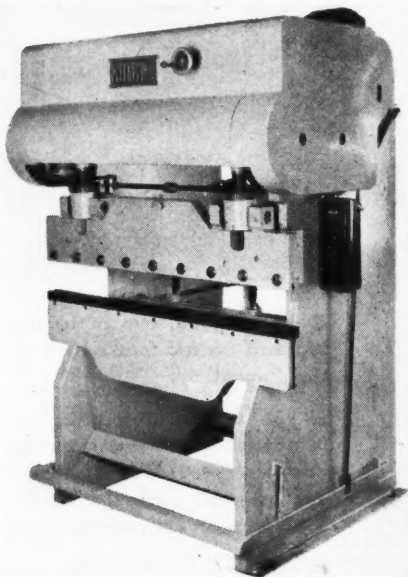
"HARDSTEEL"

DRILLS • TOOL BITS • SPECIALS

Knight Model 14B72 Press Brake

The Knight Machinery Co., 1005 S. Delaware, Indianapolis, Ind., announces the addition of an all-steel welded press brake, designated as the Model 14B72, to its line of 2, 3, 4, and 5-foot press brakes. The machine has a rated capacity for 6 feet of 14-gauge mild steel and is designed for ease of service, lubrication, and necessary repairs without the need for disassembly.

Ruggedly constructed for long trouble-



Knight Model 14B72 Press Brake

free service, the Knight Model 14B72 Press Brake is equipped with Zerk Alemite fittings, Cutler-Hammer controls, Reeves variable pitch pulley drive, Westinghouse motor, and Twin-Disc clutch.

Simplex Model 2UA Precision Boring Machine

The Simplex Machine Tool Division, Stokerunit Corp., Milwaukee, Wis., has placed in production a precision boring machine designated as the Model 2UA. The machine incorporates a sealed lubrication system in the boring heads which is said to eliminate the entrance of for-

WANT TO DOUBLE PRODUCTION WITHOUT COSTLY EXPANSION?



Air Power Can Help You

Yes, it is a fact that you can increase, even double, production of many of your machines without making costly changes or expanding your plant . . . if you apply the proper Schrader Air Cylinders and Operating Valves to existing equipment.

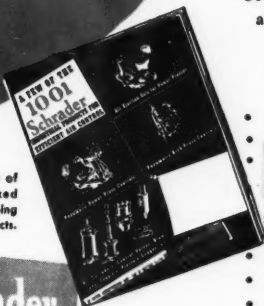
Schrader Air Cylinders eliminate slow manual operations. Operators work with greater speed and safety. They do not tire when Air Power takes over the hard jobs.

Every application for air cylinders requires the use of operating valves. Schrader not only supplies types and sizes of cylinders for all purposes but a complete range of air valves—hand, foot, or pilot-operated.

Get the story on Schrader Air Cylinders and Valves at once. And choose all other accessories from the Schrader family of air control products—the world's most complete line.

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Get your copy of this information-packed 8 Page Booklet describing Schrader Air Control Products.



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Brooklyn 17, N. Y., Dept. MM-1100

Division of Scovill Manufacturing Company, Incorporated

Please send me your **FREE BULLETIN** and more information about the products I have checked in circles below:

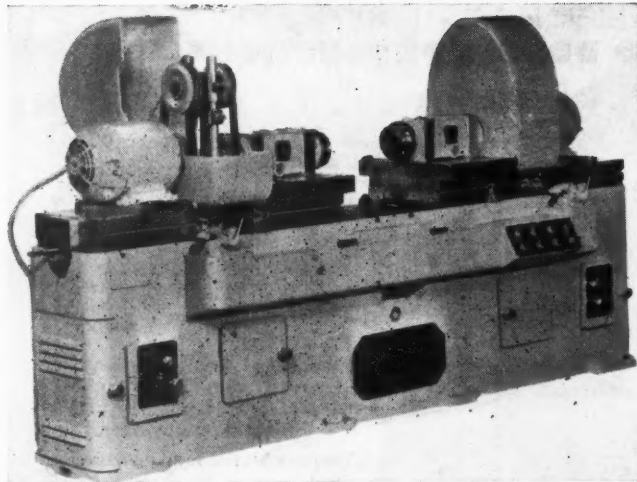
Name _____

Company _____

Address _____

City _____ State _____

☐ Air Cylinders ☐ Air Hose & Fittings
☐ Air Valves ☐ Hose Reels
☐ Press Controls ☐ Hydraulic Gauges
☐ Air Ejection Sets ☐ Air Pressure Regulators
☐ Blow Guns ☐ Air Line Compressors



**Simplex Model 2UA
Precision Boring
Machine**

ing and provides for maximum rigidity in performing heavy roughing operations. The bridges of the machine are designed to permit maximum use of multiple head installations, as well as many modifications in head mounting, thus increasing the all-around adaptability of the machine. Coolant troughs are claimed to provide adequate protection even when the op-

er-
eration calls for flooding of the part with coolant.

er-
The accompanying illustration shows the belt guard for the left head of the Model 2UA in an open position to illus-

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The accompanying illustration shows the belt guard for the left head of the Model 2UA in an open position to illus-

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The accompanying illustration shows the belt guard for the left head of the Model 2UA in an open position to illus-

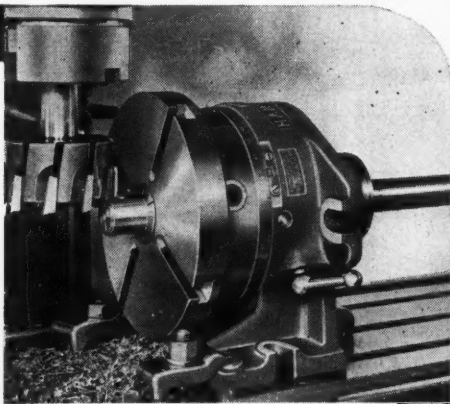
SUPER-SPACER

FOR MILLING

The uses of the Super-Spacer in horizontal and vertical milling operations are unlimited. Here the Super-Spacer, mounted with a face plate and draw-in collet combination, shows its adaptability for milling bar stock. Investigate your present milling methods and see if your shop can't profit by the speed and accuracy of the Super-Spacer. For complete details write Dept. 56.

SPECIAL MACHINERY

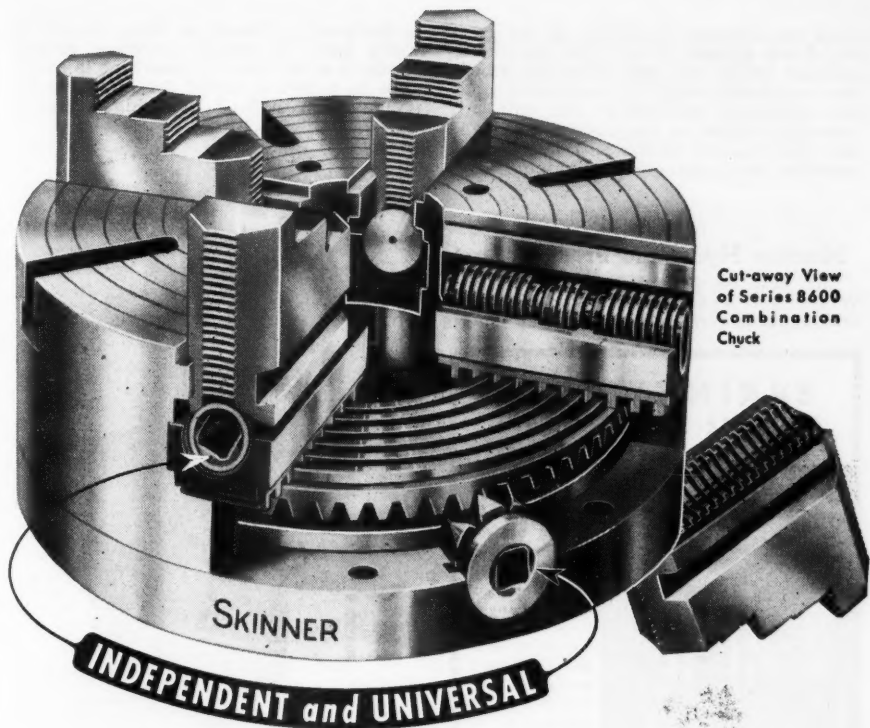
HARTFORD SPECIAL is equipped to build from prints almost any type of special machinery, parts or operations. Our facilities give your shop an added capacity. Bulletin E-200 gives complete list of our Machinery Equipment and capabilities. We'd be glad to send you one.



HARTFORD

Special

THE HARTFORD SPECIAL MACHINERY CO. HARTFORD 5, CONN.



Cut-away View
of Series 8600
Combination
Chuck

...it's a Skinner *Combination* Chuck

The fast, accurate way to chuck parts of irregular shape

Combining the flexibility of an independent chuck with the fast gripping and releasing action of a Universal chuck, a Skinner Combination Chuck simplifies and speeds the mass production of irregularly shaped precision parts. Actually two chucks in one, a Skinner Combination Chuck allows independent and accurate positioning of each jaw to suit odd-shaped pieces. When set to hold the work precisely, the wrench may be applied to any pinion to move the jaws in unison as in a self-centering Universal Chuck, thus cutting repetitive chucking time to a minimum.

Skinner Combination Chucks are precision-made tools of exceptionally rugged construction. The well-proportioned bodies have jaw slots carefully machined to close limits with heavy ribs to securely guide the jaws in their proper plane. All working parts are made of suitable alloy steel properly heat treated for their particular function.

The Series 8600 Chuck shown above is but one of a complete line of three and four jaw Combination Chucks manufactured by Skinner. It will pay you to get full details on Skinner Combination Chucks if you are interested in a faster, more accurate way to chuck duplicate parts of irregular shape.

Complete information on Skinner Combination Chucks as well as on all other Skinner chucking and vise equipment is contained in Catalog No. 60. Write for your free copy today.

The Skinner Chuck Co.
340 CHURCH STREET, NEW BRITAIN, CONN.

Skinner Chucks



HAND & POWER OPERATED MACHINE CHUCKS—AIR CHUCK EQUIPMENT—FACE PLATE JAWS—MACHINE VISES

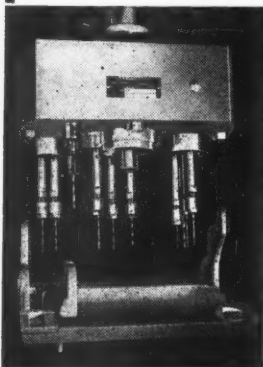
trate the extreme simplicity of the spindle drive details. Unit type hydraulic systems which are said to isolate vibration and heat from the machine proper are additional features of the unit. All hydraulic piping is manifolded to facilitate the removal of the entire hydraulic systems for cleaning and servicing.

Munton Hydraulic Press Brake

The Munton Manufacturing Co., 9400 W. Belmont Ave., Franklin Park, Ill., has introduced a hydraulic press brake which

is designed to handle a wide variety of work. Said to readily produce 90-deg. bends in mild steel, the machine is available in a 10-ton model for handling 18-gauge stock up to 3 feet long, 14-gauge

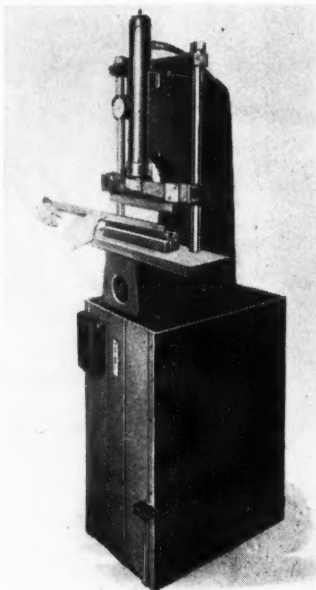
ERRINGTON for— MULTIPLE SPINDLE HEADS



Shown is a ten spindle multiple drilling head, drilling ten varied size holes on different elevations. The head has grooved thrust ball bearings at all thrust points and hardened radial bearings. It is geared approx. 2:1. All encased in a sand cast aluminum case and cover, with alemite pressure lubrication.

Send for Complete Information
Established 1891

ERRINGTON Mechanical Laboratory, Inc.
Main Office and Plant: Staten Island 4, N. Y.



Munton Hydraulic Press Brake

stock up to 2 feet long, and 10-gauge stock up to 1 foot long; a 20-ton model for handling 12-gauge stock up to 3 feet long; and a 30-ton model for handling 10-gauge stock up to 3 feet long.

The accompanying illustration shows the 10-ton model with spring return. This

TO INCREASE PRODUCTION AND TO IMPROVE EFFICIENCY USE BUTTERFLY FILING AND DIE MAKING MACHINES

This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Ammunition Plants, Toolrooms where fast production is desired. 4 Models, No. 16, No. 14 "EL" and Model "D." The larger the Model, the bigger the stroke and therefore more filing is performed. Furnished with or without pedestals. Constructed as per specification of U. S. Naval Aircraft Factories.

HARVEY MFG. CORP.

161 Grand St., New York,

Phone Canal 6-5170



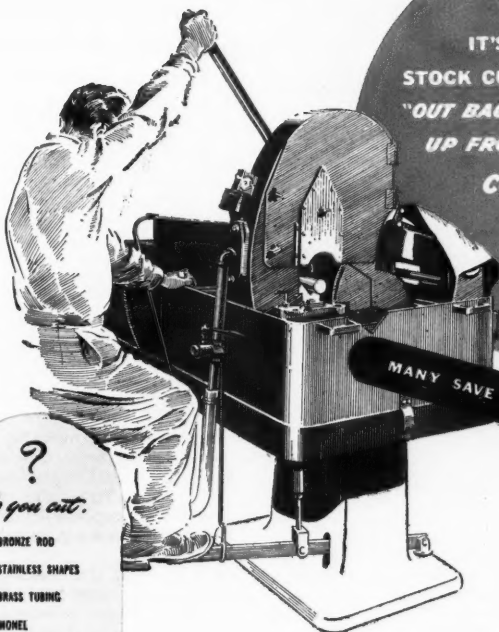
**BEWARE OF
IMITATIONS**

Our machine
carries the
Butterfly
trade mark.

Registered
U.S. Patent
Office

IT'S TIME THOSE
STOCK CUTTING OPERATIONS
"OUT BACK" WERE BROUGHT
UP FRONT FOR
COST STUDY

MANY SAVE BY DOING IT THIS WAY



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Do you cut.

BRONZE ROD
STAINLESS SHAPES
BRASS TUBING
WOMEL
PHENOLIC PLASTICS
GLASS BOTTLES
TUNGSTEN WIRE
VALVE STEMS
RUBBER HOSE
PORCELAIN

If so, *Check*
AND CALL FOR AN

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**ABRASIVE
CUTTING
EXPERT**

THE RIGHT WHEEL FOR ANY MACHINE

Do you cut rod or bar stock for machining . . . tube for rings . . . shapes for unit parts? Have you had trouble cutting or slitting tough materials like tungsten, unannealed steel, plastics, glass, ceramics? If so, we repeat, it's time your cutting problems were studied for potential cost savings . . . in the light of specialized knowledge of abrasive cutting methods.

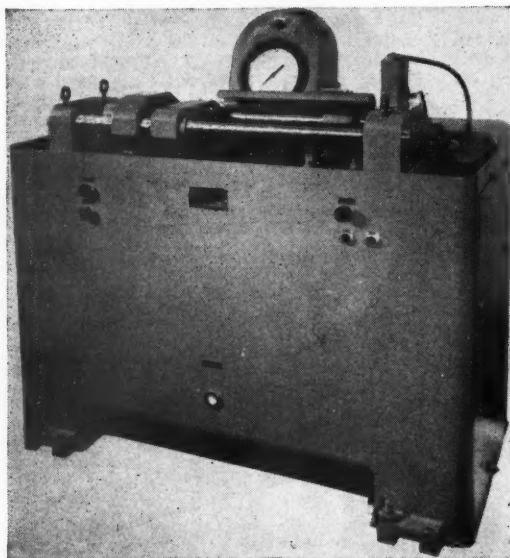
Abrasive cutting times are reckoned in SECONDS. Abrasive wheels . . . correctly selected for the job . . . cut to size within thousandths . . . leave a FINISHED surface with minimum burr . . . handle hardest materials easily.

Allison Abrasive Wheel Specialists study your problem specifically . . . bring you a wealth of cost and experience data . . . fit the wheel and the method to YOUR PARTICULAR JOB. Investigation costs nothing, simply write or call Allison.

THE ALLISON COMPANY
251 Island Brook Avenue
Bridgeport 8, Connecticut

Allison
ABRASIVE CUTTING WHEELS

94426



Steel City Hydrostatic Testing Machine

Steel City Hydrostatic Testing Machine

A hydrostatic testing machine for pressures up to 20,000 p.s.i. has been brought out by Steel City Testing Machines, Inc., 8843 Livernois Ave., Detroit 4, Mich., for the pressure testing of tubing of various lengths. According to the manufacturer, the machine is designed to seal the end of the tubing without any perceptible flare, eliminate air, and build up to the required pressure. For a predetermined time cycle it holds the pressure and then automatically reverses and is ready for the next test. The pressure gage can be disconnected during the test, the peak test pressure being indicated by a red light on the control panel. The time required for the complete cycle, including loading and unloading, is approximately four seconds.

model is intended for forming only unless the die sets are provided with springs to brake the punch and die. A dual cylinder model, providing pressure down and up, is recommended for punching, broaching, pressing, and so on. The machine has a 9-inch throat between the guide rods, which are located 20 inches apart, and a 3-inch throat from the guide rods out.

According to the manufacturer, the Munton Hydraulic Press Brake can be readily converted to a hydraulic press by removing the cross rods, tie rods, and bed. Standard equipment includes a pump, motor, cylinder, gage, and all necessary connections.

Standard equipment of the machine includes a hydraulic pump and motor, electrical timers and switches, solenoids, relays, and valves. The electrical panel is made integral with the machine base. The unit occupies a floor area of 15 square feet and has an overall height of 5 feet. It may be also built for higher pressures.

Revolator "Uplifter"

To meet the demand for a dependable lightweight machine for lifting and piling many types of material in factories,

Producers of SCREW MACHINE PRODUCTS to specifications

We know our equipment.

Can we assist in designing your screw machine products for adaptation to our equipment?

Automatics—2½" Rd. capacity, Turret Lathes—3" Rd. capacity. Castings and Forgings machined to a maximum diameter of 10", length 8", weight 15 lbs.

We are also equipped for Milling, Drilling, Threading and Tapping. May we quote?

SCREW MACHINE SPECIALTY CO.

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STerling 2235

Pittsburgh 1, Pa.

It
PAYS
to
use



APEX

sockets & wrenches

THE APEX MACHINE & TOOL COMPANY, 1028 S. Patterson Blvd., Dayton 2, Ohio

Safety Friction Tapping Chucks; Quick Change and Positive Drive Drill Chucks; Vertical Float Tapping Chucks; Parallel Floating Tool Holders; Power Bits for Phillips, Slotted Head, Frearson and Clutch Head Screws; Hand Drivers for Phillips, Frearson, Clutch Head Screws; Aircraft, Industrial Universal Joints; Sockets, Universal Joint Socket Wrenches

Here's **WHY** it pays to use Apex Sockets and Wrenches:

FIRST. They are accurately machined from electric furnace high carbon alloy bars—cold broached and carefully heat treated. They are built to stand tremendous strains and shocks.

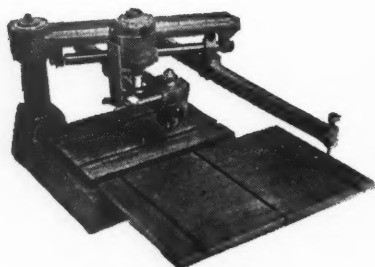
SECOND. The Apex line includes standard sockets, thin wall, extra long and extra long thin wall. Also extensions, straight nut setters, universal adapters, universal wrenches—and many others.

THIRD. Apex Universal or tension wrenches are the answer for those hard-to-get-at places. They will not bind or lock and they meet all safety requirements.

Thousands of standard items are listed in Catalog No. 19. But if you need specials, merely send us sketch, print or description and we'll quote promptly.

Solved!

Your Engraving Problem



MODEL CC 3D

A versatile machine for contour milling, profiling and engraving. Covering far larger areas and selling at a lower price than any machine now available.



Model PE-1

Pantograph Controlled

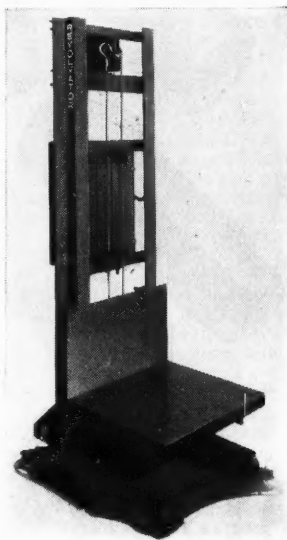
Model PE-1. Engraves an area 5 by 5 inches on curved surfaces without special templates, with smooth lines in any design, number, letter; on iron, brass, copper, aluminum, soft steels and all plastics. • Drills a series of holes • Profiles small parts • Increases accuracy and production • Works from original drawing or templates • Etches glass and similar items • Will not cause distortion. For information and prices write Dept. M.

Consult your distributor or

AUTO ENGRAVER CO., Inc.

1776 Broadway New York 19, N. Y.

warehouses, and so on, the Revolver Co., North Bergen, N. J., has placed in production a hand-operated portable elevator to be known as the "Uplifter." With Z-bar uprights, the elevator is claimed to possess unusual strength for its lightweight of 415 lb. The unit operates on Timken bearings and has turning radius of 45 inches. The overall height of the machine is 77 inches and the height of lift is 62 inches. The platform is 24



Revolver "Uplifter"

inches square and the height when lowered is 41½ inches.

By means of a unique method of lengthening the hoisting cable, running it through a double sheave, the capacity of the Revolver Uplifter may be doubled; that is, increased from 500 to 1,000 lb. maximum with approximately the same amount of pressure on the crank handle. The lift is 2½ inches per turn of the crank for the 500-lb. and 1½ inches for the 1,000-lb. capacity arrangement. The overall length of the Uplifter is 40½ inches.

Peerless Stator Stand

Production, under the trade name of Peerless, of a stand for holding the stator or frame of a traction motor is announced

You can
**LOWER
DRILLING
COSTS**

... with
**SCULLY-JONES STYLE "B"
DRILL CHUCKS**

You can save **25% or more** by replacing taper-shank with straight-shank drills and driving them with Scully-Jones Style "B" Drill Chucks. You replace worn-out drills only, as these chucks are built to outlast many drills.

Shop men like these simple, one-piece chucks, with no moving parts to get out of order; easy to insert or eject from any spindle, holder or attachment having a Morse Taper hole.

You get a positive drive when you use Scully-Jones Style "B" Drill Chucks as the milled flats on the shaft of the drill are engaged in the splined section of the chuck.

You reduce the number of rejects. Bore and shank of these chucks are ground concentric within .002", gauged at a distance equal to the projection of a standard drill from the chuck. This assures a true running tool.

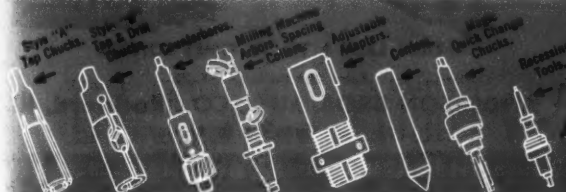
You can use these chucks also for driving deburring tools, tapered pin reamers, straight shank countersinks, counterbores, chucking reamers, etc.

SAVE
the difference
between the cost of
taper-shank drills and
straight-shank drills

For complete specifications and prices see pages 42 through 48 of Scully-Jones Tool Engineering Manual 500 or Scully-Jones Slide-Type Selector No. 5 on Style "B" Drill Chucks.

You can get
**IMMEDIATE
DELIVERY**
from our stock of all
popular sizes.

YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

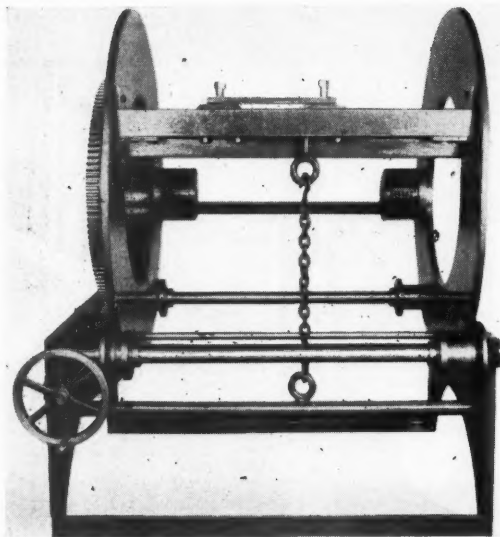


Scully-Jones
AND COMPANY

1909 S. ROCKWELL STREET
CHICAGO 8, ILLINOIS



Spindle-Type
Work Rest



Peerless Stator Stand

which supports a rotating member that is designed to permit easy installation of the stator.

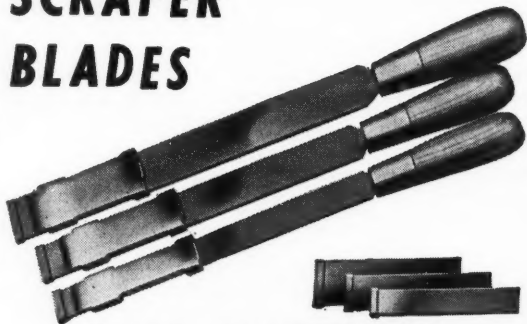
To install the stator in the stand after disassembling the motor, the stator is simply lowered into the stand with a crane and the mounting lug clamped to the framework. The entire stator and the frame are rotated as a unit on the base by a handwheel. Motion is transmitted by a self-locking worm and gear to the large gear mounted on the front of the main supporting ring. With the aid of the handwheel, the operator can easily position the stator as desired. The worm and its gear are enclosed in a housing and operate in oil. The roller supports for the large rings are equipped with anti-friction bearings.

by the Electric Service Manufacturing Co., 1741 Cambria St., Philadelphia 32, Pa. The stand is mounted on welded base

The accompanying illustration shows a chain and hook connected between the rotating member and the base. This is a

Anderson CARBOLOY TIPPED SCRAPER BLADES

Speed up scraping operations with these efficient blades. They are especially good for hard alloy iron and the extremely hard bronze castings. If you are already using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove the high-speed steel blade and slip in the Anderson Carboly Tipped Blade. They are available in three widths.



THEY LAST 8 TO 10 TIMES LONGER

Send for Bulletin 11-22

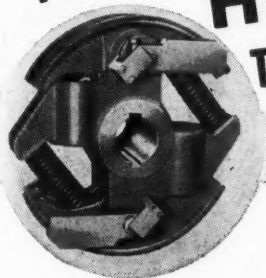
ANDERSON BROS. MFG. CO., Rockford, Ill.

See Our Catalog in Sweet's

Hand and Power Hydraulic Presses, Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters.



THE CLUTCH IS THE HEART OF THE PRESS



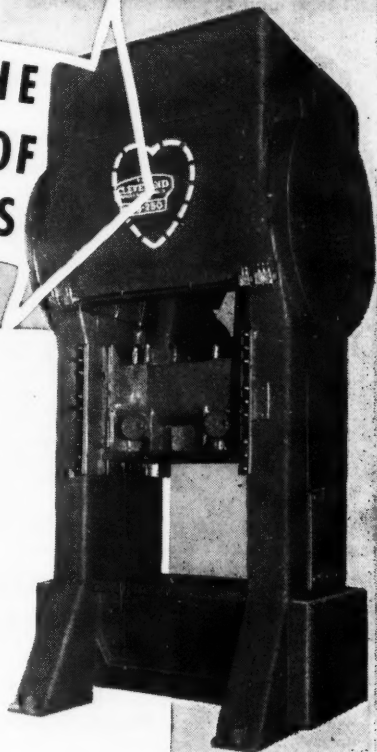
And only Cleveland can furnish you with the new (patented) Drum Type Clutch which has 14 outstanding features for economy of operation, uninterrupted production and low maintenance.

Here is a Clutch (adaptable to any type or size of Power Press requiring an electrically controlled, air operated friction clutch) which is not only different in design and construction but *different in performance.*

For longer "life" and less "down time", specify Cleveland Power Presses equipped with the Cleveland (patented) Drum Type Air Friction Clutch with spring loaded Brake.

*Light weight — fewer parts — low horsepower required for operating — quicker stopping and starting — complete disengagement of Clutch or Brake — self adjusting — can be serviced *on the Press* — Clutch and Brake a combined unit — maximum performance with minimum amount of air — positive Brake, spring operated — Clutch can be set to slip — no excessive heating — for Flywheel or Geared Type Presses — mounted directly on the drive shaft.

If interested in any type or size of Power Press we invite you to write for a copy of our Drum Type Clutch folder.



Cleveland 2 48 250 Two Point Press, double geared, equipped with electrically controlled air operated friction clutch. Stroke of slide — 12"; adjustment of slide — 6"; area of bed — 36" x 48"; strokes per minute — 20; capacity — 250 tons.

CLEVELAND PUNCH and SHEAR WORKS COMPANY

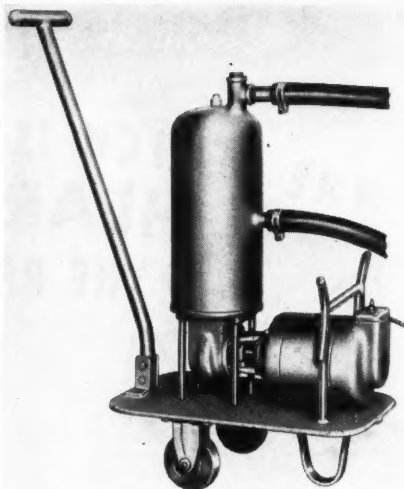
EAST 40th and ST. CLAIR AVENUE • CLEVELAND 14, OHIO

District Offices: NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH

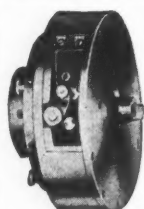
safety device which is used only during the installation of the stator; it serves as a means of positioning the stator holder and lessening the danger of shock.

Rumaco Model "R" Repriming Pump Unit

Product of the Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 2, Ohio, the Rumaco Model "R" Repriming Pump Unit illustrated herewith is designed for such work as pumping out dirty cutting oils or coolants from machine tool sumps.



Rumaco Model "R" Repriming Pump Unit

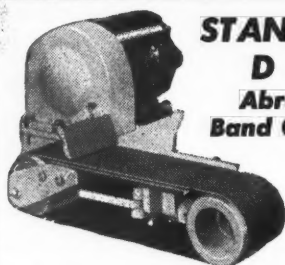


M - D Facing Heads With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT - DIXON CO.
120 PHILADELPHIA ST. HANOVER, PA.



STANDARD D - 4 Abrasive Band Grinder

Famous
for
Stamina

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36 1/4" band. The ideal portable unit.

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MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.

306 E. 38th St., New York 16, N. Y.

It is also said to provide a handy transfer pump for clean and dirty liquids.

Easy to operate and designed to require a minimum of maintenance, the Rumaco Model R Repriming Pump Unit consists of a centrifugal pump, having internal discharge features, installed in combination with a shell type reprime chamber with direct communicating discharge and inlet. The pump is mounted on a fabricated steel truck having generous size rubber-tired casters so that it can be moved both quietly and quickly. The motor of the unit is a 3/4 h.p. 3,450 r.p.m. unit, available in standard voltages and current characteristics.

The Rumaco Model R is furnished complete with two 10-foot lengths of 1-3/4 inch I.D. solvent hose, including suction



PUNCHES and DIES TO FIT ALL MAKES OF PUNCH MACHINES

Large range of round, square, flat, and oval sizes are carried in stock for immediate shipment. Special Tools Made To Order.

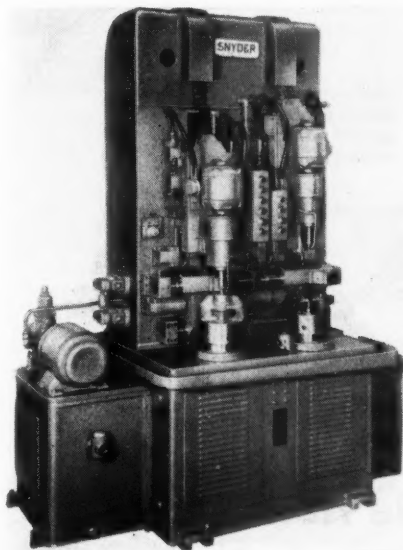
Stock Lists Available.

T. H. Lowthwaite Mach. Co.
317 East 47th St., New York 17

nozzle, and 40-foot electric cord with start-stop switch. The capacity of the unit is 40 g.p.m. at 15-foot and 50 g.p.m. at 3-foot difference in level from suction hose to discharge level when equipped with 10-foot length of suction and 10-foot length of discharge hose.

Snyder Special Center Drilling and Facing Machine

A special purpose machine built by the Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit 7, Mich., for cen-



Snyder Special Center Drilling and Facing Machine

ter drilling and facing automotive pistons is said to enable an unskilled operator to process 444 pistons an hour at 85 per cent efficiency.

The operation consists of center drilling the head end of the piston and facing a portion of the piston head, these surfaces then serving as locating points for succeeding operations. The machine is equipped with two Snyder standard hydraulically actuated slide units carrying single spindle heads used for the center drilling operation. Facing slides and tool blocks are mounted on the face of the machine

No. 2 in a series of performance case histories.



... says Plant Engineer at large thermo-plastic adhesives manufacturing plant

Actual photo of installation referred to in text. This Grant Reducer has not been removed or serviced (except for lubrication) since it was installed in 1953.

"We are using a Grant Reducer on a foil rewind machine to reduce motor speed from 1200 r.p.m. to 60 r.p.m. This reducer has been operating about 40 hours a week for 15 years and has required no maintenance except occasional lubrication, yet it's still running like new."

There's performance!

Yet it's just one of many reports coming from plants where Grant Speed Reducers are used. Is it any wonder Grant Reducers are famous for economical service?

Why not cut costs in your plant by specifying Grant Speed Reducers for extra features which add up to long, trouble-free service?

Grant Gear Works, Inc.
162 West Second Street
South Boston 27, Mass.

WRITE TODAY
FOR FREE
CATALOGUE

7 YEARS - GUARANTEED TO MEET INDUSTRY'S NEEDS FOR 71 YEARS - 1940

Grant

SPEED
REDUCERS

7 gear arrangements... hundreds of ratios

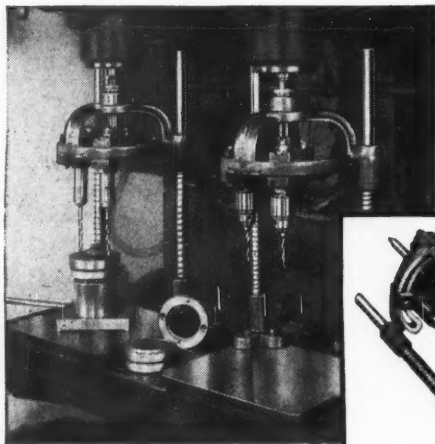
column and are hydraulically actuated in a horizontal position.

Two rotating four-jaw chucks are mounted in the machine base directly beneath the centering spindles, two of the four jaws having radial locators. The jaws are hydraulically actuated. The chucks are equipped with a height locator which contacts the inside of the piston head and thus establishes a controlled thickness during the top facing operation.

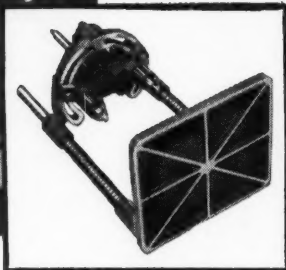
Each cross slide carrying tool blocks has an independent hydraulic feed system which permits the operator to load and unload a piston at one side of the ma-

chine while the opposite side is being used in machining a piston. The centering spindles and chucks are driven by individual motors through V-belts and sheaves which can be easily changed to alter the r.p.m. of each. The feed rates of the center drill and facing slides are adjustable through feed control valves and the centering spindles.

The base and column of the machine are of welded steel, thoroughly normalized and properly ribbed for rigidity. A hydraulic pump and tank unit is mounted on one side of the base and a coolant tank and chip tray on the opposite side.



Overarm Type has heavy guide pins, ground base 12 by 14 inches.



LINDERME 2-Spindle Head

"increased production from 160 to 600 an hour"

This story is typical of the many applications of Linderme 2-spindle drill heads on long and short runs. You'll like these features: drills, taps—in metal, wood, plastics; quick, accurate adjustment, $\frac{1}{2}$ " to 6" centers; two minute set-up on most drill presses in

your shop; anti-friction bearings, rugged gearing, quality machining—and Linderme's low initial cost for Overarm or Sleeve Types—Twelve models, capacities up to $\frac{3}{4}$ ", available with G.M. Sleeves or Morse Tapers. Write for complete catalog.

LINDERME MACHINE AND TOOL CO., INC.

12247 COYLE AVE. • DETROIT 27, MICH.

Grand Rapids Model 2D-1 Tap Grinder

The Gallmeyer & Livingston Co., 308 Straight Ave., S.W., Grand Rapids 4, Mich., has announced the Grand Rapids Model 2D-1 Tap Grinder illustrated herewith which has a capacity for No. 6 to 3-inch taps. The machine is a double-end spindle type which permits two taps to be ground at the same time on the two wheels.

The Grand Rapids Model 2D-1 Tap Grinder is designed to efficiently grind pipe taps, pulley taps, nut taps, taper taps, hand taps, and machine taps, including taps with two, three, four, five, or six flutes. The threads may be A.S., S.A.E., V.S.A.E., Acme, square, and so on. A special attachment for bent shank taps is available. Any desired angle of entrance taper at the point of the tap

FRICTION SAWING

solves thousands of Problems!



FOR EXAMPLE:

CUTTING side panels of a barometric damper as shown above. Cost of dies required for seven sizes would have approximated \$12,000 — a prohibitive sum for volume required on these sizes. Friction-sawn on a TANNEWITZ High Speed Band Saw in multiples of two in 1.2 minutes each — a very moderate cost which makes feasible the complete line required. Cost of machine was only a small fraction of cost of dies contemplated and it is also available for many other uses.

For trimming castings, formed parts, cutting metal as hard as a file and dozens of other operations, too, friction sawing with TANNEWITZ High Speed Band Saws offers tremendous advantage. Write for free booklet, "FRICTION SAWING."

THE TANNEWITZ WORKS GRAND RAPIDS 4,
MICHIGAN

can be ground on the Model 2D-1. Whatever the angle, all flutes are said to be ground the same, thus assuring an equal amount of cutting by each land.

A diamond truing device with two diamonds is furnished as standard equipment of the Model 2D-1. The spindle of the machine is equipped with double-row precision ball bearings which are said to be capable of resisting heavy combined radial and thrust loads. The bearings are grease-packed and sealed for life. The spindle is driven through V-belts from a 1½ h.p. motor mounted in the base of the machine. Belts can be



Grand Rapids Model 2D-1 Tap Grinder

replaced without dismantling the spindle assembly since the right-hand bearing is mounted in a housing cast integral with the main housing.

The main column of the machine is a heavy rigid casting. The weight of the Model 2D-1 is 900 lb., thus eliminating the necessity of fastening the machine to the floor for satisfactory operation.



It's dangerous to cut Keyways under pressure with an exposed, unprotected blade.

Get KEYWAYS Safely with The GLENNY Adjustable Expansion PUSH BROACH

SEND FOR NEW BULLETIN 11

Safe from rejects thru error—the Glenny assures maintained accuracy on all work.

Safe from rejects due to scoring of the bore.

Safe from blade breakage because sleeve of broach protects blade when tool is under pressure.

Safe for operator—sleeve acts as guard—unprotected, unsupported blades become a hazard to face and body of operator when cutting pressure is applied.

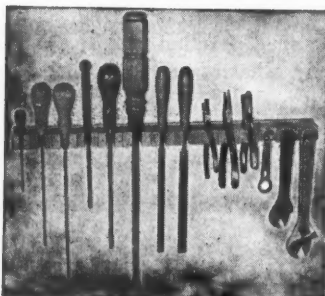
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NOW—NEW GLENNY BUSHINGS ADAPT STANDARD GLENNY BROACHES TO MANY NEW TIME AND MONEY SAVING OPERATIONS

11 The EAST SHORE MACHINE PRODUCTS CO.
833 EAST 140TH STREET • CLEVELAND 10, OHIO

General Purpose Hand Truck

A lightweight but extremely rugged general purpose hand truck featuring two chime hooks which are adjustable for



TOOLRAK Saves TIME AND TOOLS

Your workers always have the right tools at their fingertips when you equip your shop with Toolrak. Because the selected hard-wood blocks are interchangeable in the extruded aluminum back-strips, you arrange them any way you want, rearrange as often as you wish. Get Toolrak in factory-assembled sets or buy individual blocks and strips to fit your special needs. Send for free folder.

Set No. 8-7, 8" long, holds 7 tools, \$1.25

Set No. 12-10, 12" long, holds 10 tools, \$1.90

Set No. 18-14, 18" long, holds 14 tools, \$2.55

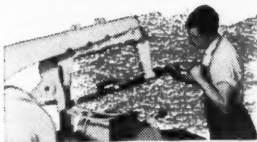
If your dealer or mill supply house can't supply you, order direct. Mail orders add 10¢ per set to cover packing and mailing.

DAVIS DEVELOPMENT CO. • 348-S 1st Nat'l Bk. Bldg.
Colorado Springs, Colo.

NEW SIMOMETER



Here's how
**SIMONDS Quick and Easy Tensioning Method gives you
 LONGER BLADE LIFE!**



Avoid Undertension which causes crooked cutting, spoiled work, lost time.

Avoid Overtension which causes blade-vibration, rapid dulling of teeth, frequent blade-breakage.

Slip the Simometer Directly over Blade, tighten two thumb-screws... now put tension on blade until **Simometer** needle moves into green zone... and you can see at a glance you have the right tension on the blade. Ask your distributor.

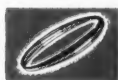
SIMONDS ALSO MAKES:



FLAT GROUND STEEL STOCK



"RED END" FILES



METAL-CUTTING BAND SAWS



CIRCULAR METAL-CUTTING SAWS



SIMONDS "Red End" HACKSAW BLADES



BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Washington. **Canadian Factory:** 595 St. Remi St., Montreal 30, Que.



General Purpose Hand Truck

locking barrels and kegs of different heights firmly in position is now available from the General Scientific Equip-

ment Co., 27th & Huntingdon Sts., Philadelphia 32, Pennsylvania.

Well balanced so that most of the load is carried on the wheels, thus making it easy to use and handle, the truck is regularly furnished with hollow-center puncture-proof cushion tires with lug bases and Durex self-lubricating bearings. Where acid and oil-resistant wheels are required, the truck can be furnished with aluminum wheels.

Millholland No. 5 Automatic Index Machine

The accompanying illustration shows the Millholland No. 5 Automatic Index Machine developed by the W. K. Millholland Machinery Co., 1048 Fairfield Ave., Indianapolis 5, Ind. The machine incorporates (in the vertical position) the newly redesigned No. 5 Millholland automatic unit which has a 10 h.p. capacity and 6-inch stroke. The horizontal side head shown is the No. 4 size with 5 h.p. drive and 5-inch stroke. Other units may be added around the index table to perform additional operations as required.

The automatic index table is independently motor driven and synchronized

As Every Machinist Knows IT PAYS to REDUCE TAP BREAKAGE

The DAHLSTROM TAP GUIDE does the job in a fraction of the time required for hand tapping. Because the work is dependably straight and square, tap breakage is practically eliminated—and gone are the hours wasted prying broken taps out of dies. Equipped with seven Adapters, ranging from 8-32 to 1/2", it takes care of 95% of all tapping requirements. Taps not furnished. Dahlstrom Manufacturing Co., 418 South Sixth St., Minneapolis 15, Minn. \$52.50 F.O.B. Minneapolis. Circular on request.



Dahlstrom TAP GUIDE

- 12" x 6" x 14"
- Fastens to wall or bench
- Anyone can operate it

NEVER BEFORE

A SURFACE GRINDER LIKE THIS

The most important
Surface Grinder
development in years!

**LEACH 6X12
SURFACE GRINDER**

ONLY

\$485 00

COMPLETE WITH MOTOR

F. O. B. PROVIDENCE, R. I., U. S. A.

Look at that low price, then consider these facts carefully:
The Leach 6 x 12 Surface Grinder actually handles 90%
— yes, 90% — of the work of larger, far more expensive
machines. It's a completely self-contained unit with a
2-speed ball bearing spindle, driven by a $\frac{3}{4}$ HP motor.
It's accurate, time-saving, vibrationless, and proved to
the hilt by hundreds of enthusiastic owners. Write to
us for detailed description.



H. LEACH MACHINERY CO.

387 CHARLES STREET

PROVIDENCE 4, R. I., U. S. A.

WORLD DISTRIBUTORS

DEALERS IN PRINCIPAL CITIES

**SPECIAL
MOTORS for**
Special Jobs!



Get *"Dependable Power"*
with Custom-Built
DOERR Motors!

Although we have been building standard fractional H. P. motors for years, the majority of our production is taken by manufacturers whose basic product design or end-use requires special features. We are providing such service to many leading names in industry, and would be pleased to consult with you on your motor design problems.

Write for Catalog and Prices

68 No. Third St., Cedarburg, Wisc.

**ELECTRO
MACHINES, INC.**

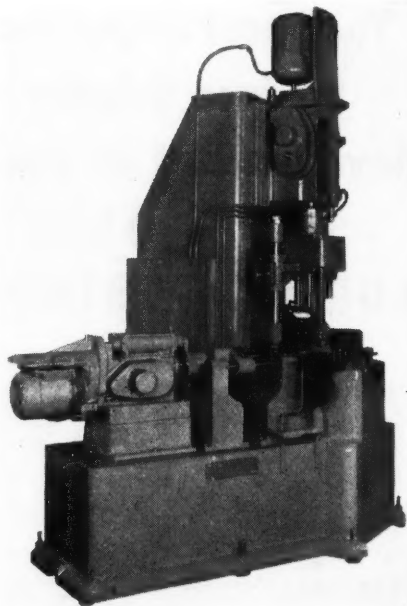


From 1/20 to 2 H. P.

Standard or Designed
to Your Specifications

with the movement of the units by means of limit switches. The index table can be obtained in various sizes up to 42 inches with indexes of up to 600 or more per hour. The machine is arranged for continuous or intermittent operation by push-button control, and the operator is required only to load and unload fixtures. Two or more pieces can be loaded at a station where the design of the part permits.

The machine base and column are of

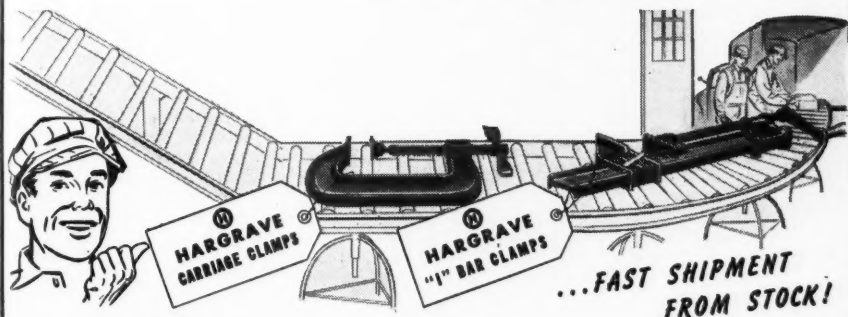


Millholland No. 5 Automatic Index Machine

welded steel construction, well ribbed and normalized. The automatic units are mounted on sub-bases with micrometer screw longitudinal adjustment. The vertical multiple head is counterweighted. The multiple heads are mounted on hardened steel glide bars and equipped with a bushing plate arranged to register on the fixture at each index, although fixed bushing plates can be used when the design permits.

According to the manufacturer, the Millholland No. 5 Automatic Index Machine is suitable for drilling, reaming, tapping, and counterboring, chamfering, or spot-facing operations. The machine

"They're rolling off the line"



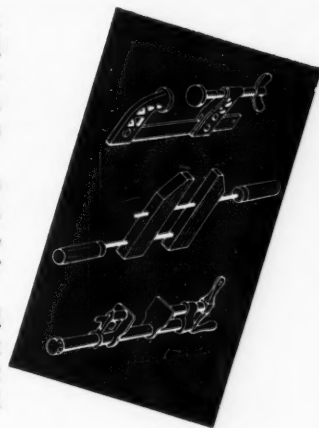
(H) HARGRAVE I BAR and CARRIAGE CLAMPS

Our production planning is paying off. We're producing No. 640 I-Bar Clamps and our new No. 530 Carriage Clamps in quantities greater than ever . . . Now, you can reach for your phone and get immediate delivery from stock.

The No. 530 Carriage Clamp frame is made of a powerful new metal far stronger than malleable . . . proved under **INDIVIDUAL POWER TESTS**. Openings in all popular sizes.

The Hargrave "I" Bar Clamp is rapid and powerful. Notches in web permit quick action, no slipping. Screw is steel, heat treated to prevent bending and battered threads. Openings from 2 ft. to 10 ft.

Write for Catalog of complete line.

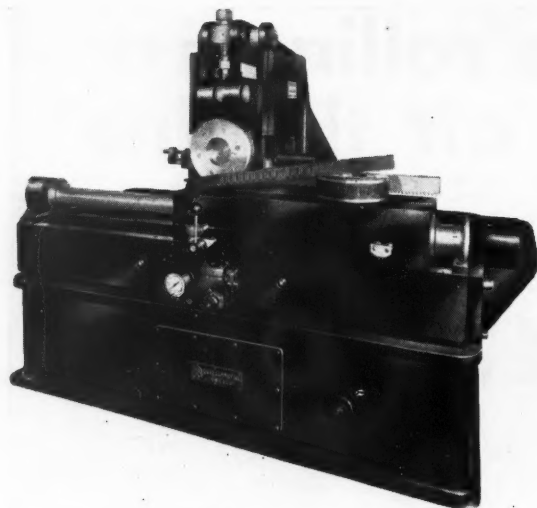


(H) HARGRAVE

SEE YOUR NEARBY INDUSTRIAL DISTRIBUTOR

The Cincinnati Tool Co.

1947 Waverly
Cincinnati 12, Ohio



Schmidt Model 325 Scale Marking Machine

Schmidt Model 325 Scale Marking Machine

Identified as the Model 325, a hydraulic scale marking machine which is designed to roll numbers and graduations into metal bars and plates such as scale beams, machinery scales, carpenters' squares, and so on, has been brought out by Geo. T. Schmidt, Inc., 1806 W. Belle Plaine Ave., Chicago 13, Ill. The machine may also be used for rolling lettering on milk can bands or barrel hoops up to 30 inches long.

The table upon which the work rests during marking is bored for the hydraulic cylinders of the machine and is geared to the knurl, thus providing the positive feed necessary to eliminate crawl or skid

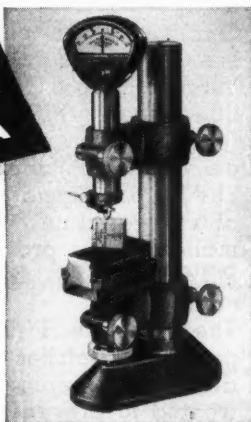
arranged as shown is intended for machining a bracket for a steering gear housing.



Positive, Dependable
Repeat Readings

NO friction, lag or backlash . . . no racks, pinions, gears, levers, etc. subject to wear. Pointer responds instantly without swinging past true reading. Amplification is 100% mechanical, no lights or electromagnets, no warming up period required. Easily moved to different locations as there are no electrical connections. Our engineering department is at your service for applying Mikrokator to your measuring problem.

Write for Literature—MMS.



Graduated—.0001" to
to .00002".
Graduated—.001mm
to .0002mm.

SWEDISH GAGE CO. OF AMERICA

8900 ALPINE AVE., DETROIT 4, MICH.



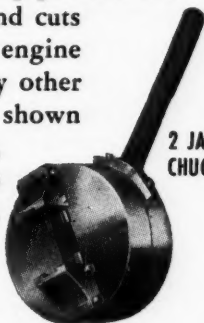
Barker Two-Jaw or Three-Jaw **WRENCHLESS CHUCK**

will pay for itself in 60 to 90 days on production schedules by giving **MORE** parts per hour at a **LOWER** cost per part. Most round parts can be set in the Barker Wrenchless Chuck without stopping the machine. It saves time, helps speed up production, is simple to operate, reduces operator fatigue and cuts spoilage where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine. The Barker Chuck shown above, replacing an ordinary 3-jaw chuck, jumped production from 18 to 24 pieces per hour. It can do it in *your* plant too. Let us show you how!

**3 JAW
CHUCK**



**2 JAW
CHUCK**



Write for bulletin 201 today.

Chuck Division
THOMAS HOIST CO.
28 S. HOYNE CHICAGO 12

between the work and knurl, it is claimed. A convenient hand lever at the front center of the machine trips a valve to start the table for a positive travel stroke, which is adjustable from 6 to 30 inches by means of movable stop dogs. The table stops automatically at each end of the stroke for feeding, thereby permitting marking in both directions. The pressure control valve is synchronized with a gage at the front of the machine.

The head of the Model 325 is controlled by a separate hydraulic cylinder which provides the knurl with a maximum ver-

tical movement of $\frac{3}{8}$ inch. Head screws provide a 2-inch adjustment from 1 to 3 inches from the face of the table, which is available with a $\frac{5}{8}$ -inch T-slot cut longitudinally or with six $\frac{5}{8}$ -inch tapped holes for fixture mounting.

"Hook-'N-Haul" Truck

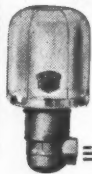
Known as "Hook-'N-Haul," a truck for tote boxes, cases, and so on, is being marketed by Techtmann Industries, 714 W.



"Hook-'N-Haul" Truck

TRICO OILERS

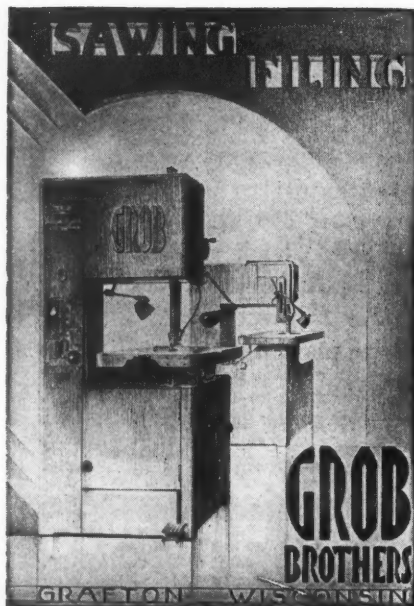
Increase Production



- FULLY AUTOMATIC
- END BEARING FAILURES
- SAVE OIL-TIME-WORRY
- MODERNIZE EQUIPMENT

Many Styles and Sizes
Write for Catalog

TRICO FUSE MFG. CO.
Milwaukee Wisconsin



Wisconsin Ave., Milwaukee 1. Wis. The truck includes a double-hook feature which is so designed as to enable the hook-arm to bite into totally enclosed wood boxes or cases or into open boxes, while the upper hook conveniently takes hold of handles on metal tote boxes, and so on. Easy manipulation of the hook-arm is afforded by a convenient hand grip on the arm itself.

When a load is "hooked," the operator merely pulls backward on the hook-arm, thereby causing the load to readily slide onto the balanced tilting carrier plate of the truck. Bulky boxes can be "tumbled" onto the carrier plate. The powerful lev-

New Nesting Type TOTE PANS

20" Long x 12"
Wide x $\frac{6}{4}$ " Deep
16 Ga., drag holes,
handles both ends.



J. L. LUCAS & SON, INC.
BRIDGEPORT 5, CONN.

3 HANDEES COVER the FIELD

TOOLS OF 1001 USES GRIND, DRILL, POLISH,
ENGRAVE, CUT, CLEAN, SAW, CARVE, SAND

For Work on Metals, Alloys, Wood, Plastics, Stone, Horn,
Bone, etc. Plug in any AC or DC socket.

HANDEE 44

A good production tool. Has everything—speed, power, versatility and pencil-point precision. Constantly cooled by forced air, the 44 runs cool and smooth all day long. Weighs 2 lbs. 8½" long. 20,000 r.p.m. \$31.50. In wood case with accessories \$42.50.

HANDEE Hi-Power

A big fellow. Fast, powerful, sturdy, for continuous work. Has ample power to drive a 2½" diam. wheel. Weighs 3 lbs. 10" long. 17,000 r.p.m. In case with accessories \$42.50.

HANDEE

First tool of this type—today's finest. For precision work. Also gets into hard-to-reach places to make machinery repairs. Weighs 12 oz. 6½" long. 25,000 r.p.m. With 7 accessories \$20.50. Handee with 40 accessories in case \$27.50.

CHICAGO ACCESSORIES

Grinding and mounted wheels, sanders, steel cutters, etc.—the most complete line to fit any powerful tool — over 500 of finest quality — all made in our own plant.

HANDEE TOOLS and ACCESSORIES are in stock in principal industrial areas.

Write for catalog.

- ☐ Send Handee 44
- ☐ Hi-Power
- ☐ Handee
- ☐ Remittance enclosed
- ☐ Send C.O.D.
- ☐ Send Catalog

CHICAGO WHEEL & MFG. CO., 1101 W. Monroe St., Dept. MM, Chicago 7, Ill.

Name.....

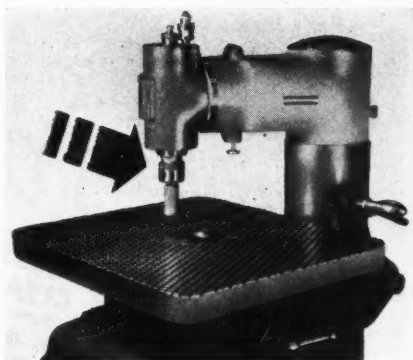
Address.....



erage principle employed is said to reduce operator effort to a minimum.

To discharge a load, the hook-arm is given a slight push, thereby overbalancing the carrier plate and allowing the load to slide gently to the floor. The carrier plate is constructed of parallel steel plates and is balanced so that a forward movement of the hook-arm places the carrier plate in loading position. In pulling position or when a load is being hauled, the carrier plate is automatically tilted back off the floor.

Of rugged all-steel welded construction, the Hook-'N-Haul Truck is equipped with one swivel and two stationary casters (either steel or rubber), and can be easily turned in its own axis. The unit is painted fire-engine red for quickly locating when needed.



Boyar-Schultz Improved No. 2 Profile Grinder

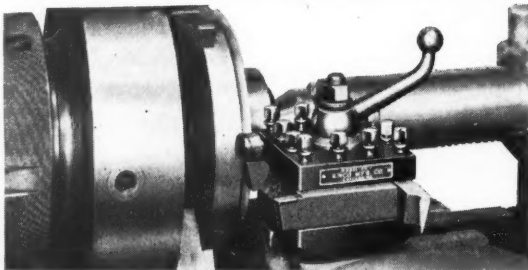
Boyar-Schultz Improved No. 2 Profile Grinder

The Boyar-Schultz Corp., 2110 Walnut St., Chicago 12, Ill., announces that its No. 2 Profile Grinder is now being built with an improved holding arrangement

for grinding wheels. This arrangement involves the use of a specially designed double taper collet chuck which is attached to the top of the spindle. The chuck is constructed to accommodate collets in sizes from $\frac{1}{8}$ to $\frac{5}{8}$ inch in steps of $\frac{1}{16}$ inch.

In addition to providing for more efficient holding of grinding wheels, the

PUT AN ENCO TURRET TO WORK FOR YOU



Model HD-1 at left is one of the many turrets shown tooled on actual jobs in the new catalog No. 48. Write for your copy giving lathe and size. No obligation for our recommendation.

**TURRETS FOR
ALL 9" TO 42" LATHES**

- ★ All Hardened Construction
- ★ 12 Position Indexing
- ★ 3 Working Positions For Each Tool
- ★ Rigid Mounting in T-slot
- ★ 30° Indexing Permits the Use of Standard Tools Without Regrinding

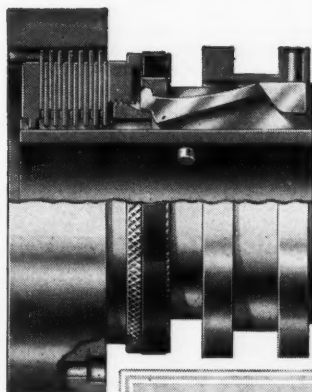
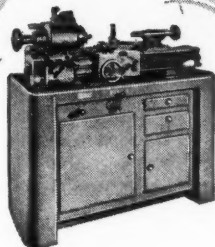
- ★ Precise Reindexing
- ★ Self Contained Index Mechanism
- ★ Fingertip Tool Position Control
- ★ No Chip Interference
- ★ Immediate Delivery on All Models With Machinable Base

Also Mfgs. of Bed Turrets for All Lathes 9" to 16" Swing.

ENCO MANUFACTURING COMPANY
DEPT. 1118 4522 FULLERTON AVE., CHICAGO 39, ILL.

MAXITORQ

keeps Good Company!



MAXITORQ Floating Disc Clutches have gained another friend... The Wade Tool Company, Waltham, Mass. Their No. 8A Toolmaker's Precision Lathe uses this modern machine tool clutch in the motor drive so that the headstock spindle can be quickly stopped or started independently of the motor, eliminating the inertia or fly wheel effect of the rotor. Also, the spindle is more easily inched by hand.

The design features of Maxitorq were especially created to solve power transmission problems for builders of machine tools and various types of production machinery. Compactness is outstanding... Separator Springs (patented) keep discs apart (floating) in neutral, to prevent drag, abrasion, heating. The clutch is shipped completely assembled on the body ready to slip onto

a shaft. No tools whatsoever are required to assemble, adjust or take the clutch apart.

Both single and double clutches are standard in 8 sizes to 15 H.P. at 100 r.p.m. ... also in pulley and cut-off coupling types.

We invite your investigation, confident that the Maxitorq will provide the smooth, trouble-free power transmission you need. Join the growing list of machine manufacturers who "keep good company with Maxitorq."

Send for Catalog No. MM-11



THE CARLYLE JOHNSON MACHINE COMPANY
MANCHESTER • CONNECTICUT

improved holding arrangement of the grinder permits the use of wheels with any shank size within the limits of the above dimensions. A convenient method of tightening and loosening the collet chuck is afforded by the improved machine. One ½-inch collet is furnished as standard equipment.

Approved Cut-Off Machine

A portable light duty cut-off machine which is said to cut aluminum, brass, rod, drills, Monel metal, nickel, pipe, tool



Approved Cut-Off Machine

steel, tubing, plastics, fiber, tile, and other materials is now being manufactured by the Approved Devices Co., 525 Woodward Ave., Detroit 26, Mich. To cut material, the lever handle of the machine is simply pulled down so that the cut-off wheel is fed through the workpiece. If the material to be cut is heavy, a screw handle can be provided for feeding the cut-off wheel steadily and smoothly. Attachments for cutting at 45-degree angles or any other desired angles can also be provided.

The Approved Cut-Off Machine can be furnished with or without a ¼ h.p. 110-volt 60-cycle single-phase a.c. motor, together with cord and switch. The machine measures 24 inches long x 10 inches wide x 11 inches high overall and has a spindle speed of 5,800 r.p.m. The weight of the unit with motor is 53 lb. and without the motor, 28 lb. Designed to utilize a 6-inch diameter x ⅛-inch thick abrasive



ATLAS UNIVERSAL JOINTS

Joints may be fitted to specification or with:

- round bore
- keyway
- square hole
- shoulder

Fitted to exact specification at a guaranteed saving per unit.

- Short stubby jaws for maximum strength and economy of space
- Made from heat treated alloy steel for maximum physical properties
- Bearings located maximum distance from joint center, cutting bearing load and wear
- Sizes over 1½" O.D. have grease reservoir, an Atlas exclusive
- Send blueprint for quotation, or write for catalog. Large stock on hand

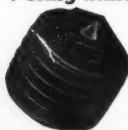


GRAY & PRIOR MACHINE CO., HARTFORD 5, CONN.
130 SUFFIELD STREET
In the West: Link Bell Co., Los Angeles, San Francisco
Portland, Seattle, Oakland, Spokane, Dallas



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in ⅜" to 1" diameters. Send for price list.

HEIMANN MFG. CO.

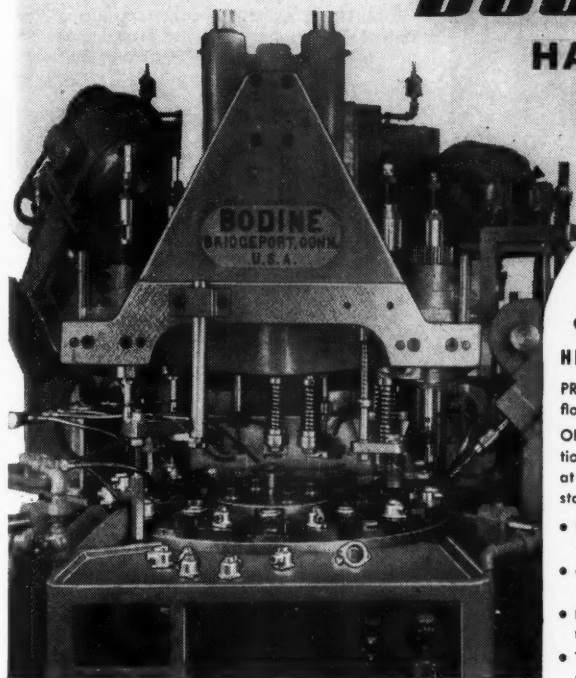
330 Lincoln Ave.

Urbana, Ohio

HERE'S ONE ANSWER TO MODERN PRODUCTION

Bodine

HAS
PLENTY
MORE!

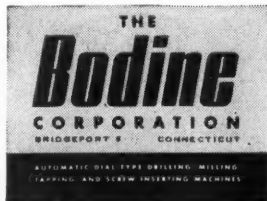


**AUTOMATIC MILLING
DRILLING, TAPPING
SCREW INSERTING**

YOU CAN'T MEET TOMORROW'S
COMPETITION WITH YESTERDAY'S
MACHINE TOOLS.

Ask Bodine engineers to adapt one
of our 6 standard machines to suit
your small parts production.

ARD48



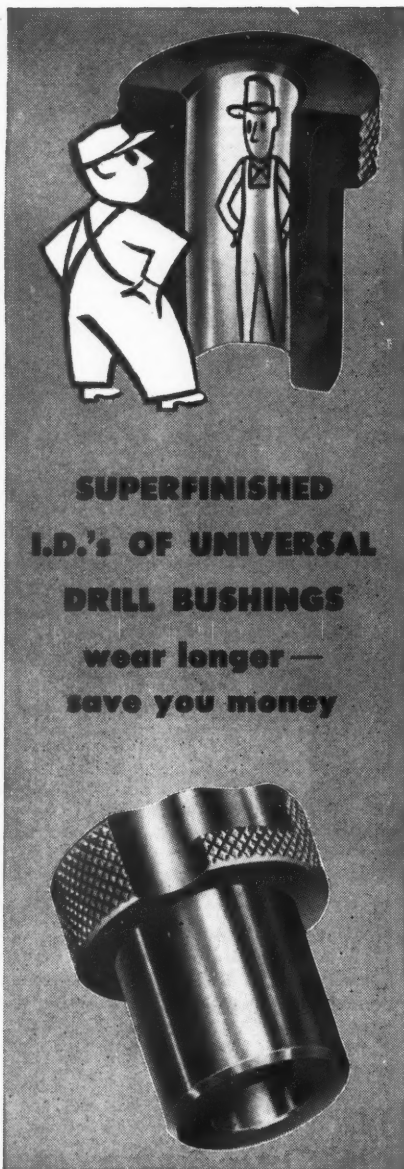
HERE'S HOW COSTS GO DOWN

PRODUCT: 2 end pieces of brass cast float valve body.

OPERATIONS: Dial has alternate stations, operator loads one fresh casting at each stroke, transfers one piece from station to next one, opposite end up.

- Part automatically clamped by air cylinder.
- Combination tool faces part over 2 1/4" dia.
- Drill, countersink 2 #25 holes thru 1/4" thick ears (combination tool).
- Tap both holes 10-24, completing first pass under spindles. Part turned, located from finished face and 2 ear holes.
- Core drill and face the hole for 1/4" pipe tap.
- Tap 1/4" pipe thread.
- Core drill and face 7/16" dia. hole at right angles to axis (combination tool, horizontal spindle).
- Drill, counterbore 1/4" dia. hole, 45° from axis.
- Tap above hole (angularly mounted drilling and tapping spindles).

PRODUCTION: By changing dial fixtures both ends of body are produced on this Bodine 42-30 machine...15 complete components per minute.



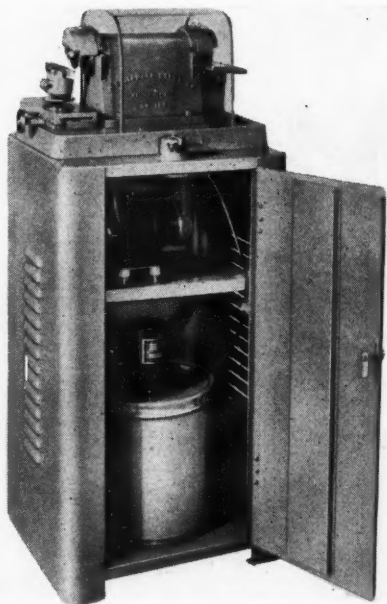
**SUPERFINISHED
I.D.'s OF UNIVERSAL
DRILL BUSHINGS
wear longer —
save you money**

**UNIVERSAL ENGINEERING CO.
FRANKENMUTH 9, MICH.**

wheel, the machine can be furnished with a steel stand measuring 12 x 24 x 30 inches high and weighing 15 pounds.

U. S. Model CH-105 Carbide Tool Grinder

Identified as the Model CH-105, a carbide tool grinder utilizing small diameter diamond wheels and designed to accom-



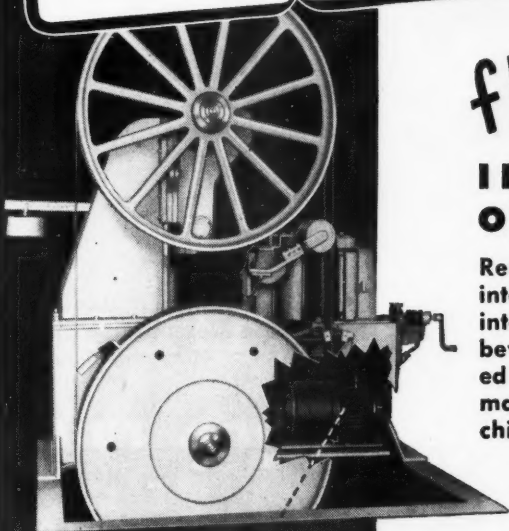
U. S. Model CH-105 Carbide Tool Grinder

modate tools having up to 1-inch shanks has been placed on the market by the U. S. Diamond Wheel Co., 701 Illinois Ave., Aurora, Ill. The machine is provided with a spindle speed of 9,000 r.p.m., the spindle being mounted in a removable cartridge type ball bearing unit.

The diamond wheels utilized by the Model CH-105 each have a full 3/4-inch wide grinding surface and are located at a convenient operator height. Constructed so that table angles are easy to read, the machine includes an all-angle vise for quick chip breaker grinding setups.

Available in single-end, double-end, or single-end and chip breaker types, the U. S. Model CH-105 Carbide Tool Grinder is

*saxton
resaws* + *LIMA
gearshift
drives* = *40 to 300
f.p.m.
resawed
lumber*



flexibility IN RESAWING OPERATIONS

Resawing 2" or heavier boards into 1" boards—Ripping 2x8's into 2x4's or manufacturing beveled siding is accomplished with the Saxton Resaw, manufactured by Saxton Machinery Co., Albuquerque, N.M.



Single phase units built in $\frac{1}{2}$ and $\frac{3}{4}$ hp sizes. Polyphase in sizes from $\frac{1}{2}$ to 20 hp.

The flexibility of producing from 40 to 300 f.p.m. of resawed lumber is obtained by using a 4 speed LIMA Gearshift Drive. This is built into the Saxton Resaw as an integral part of Original Equipment. LIMA can solve your drive problems — write for Bulletin.

THE LIMA ELECTRIC MOTOR CO.

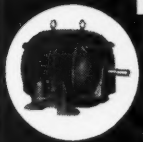
184 FINDLAY ROAD

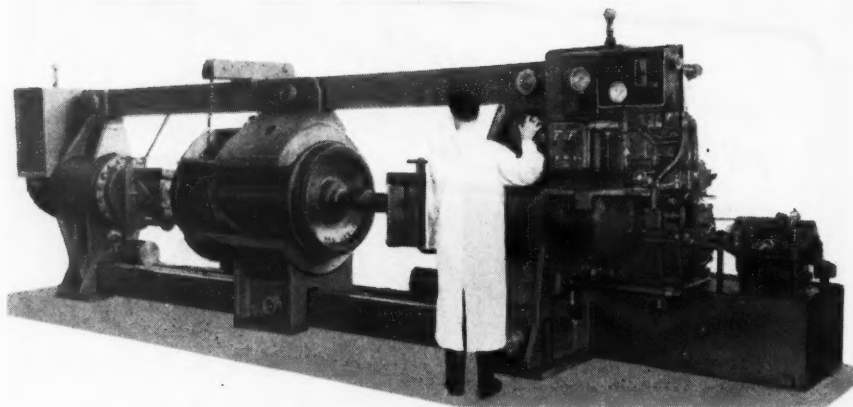
LIMA, OHIO

REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES

LIMA PEDESTAL GRINDERS - LIMA ELECTRIC MOTORS





Watson-Stillman Double-End Production Demounting Press

supplied complete with a cabinet, $\frac{1}{2}$ h.p. 3-phase 60-cycle 220-volt motor, coolant pump, wheel guards, and one diamond grinding wheel for each end. The machine, which occupies a floor area of 24 x 24 inches, has a spindle height of 46 inches and shipping weight of 225 pounds.

Watson-Stillman Double-End Production Demounting Press

A double-end production demounting press which is said to be capable of handling all types of wheel sets without the use of spacers has been developed by

PARTS DRAWN OF STAINLESS STEEL OR OTHER METAL PARTS PRODUCTION



HERE'S WHAT WE CAN DO FOR YOU . . . We are equipped to produce at low cost, deep draws in stainless steel, aluminum, sheet steel, etc. It is routine production to hold wall thicknesses and tolerances to close limits. Therefore, it is possible for us to adhere to the most exact specifications. We are producing Stainless Steel pen and pencil caps for one of the leading manufacturers and many other items for varied industries. Write for information.

PARTS SHOWN ONE-HALF SIZE

KANKAKEE TOOL AND DIE WORKS, INC.
MFRS. OF METAL PARTS - DEEP DRAWING - STAMPING - FORMING

336 SCHUYLER AVE.

DEPT. 3E

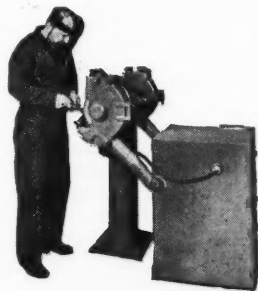
KANKAKEE, ILLINOIS



TORIT DUST COLLECTORS

**"coast" through the day's work
in this machine shop.**

Many different jobs, some of unusual shape, made dust collecting a problem on this cutter-grinder. It was solved with a mobile *Torit* Dust Collector mounted on casters, and flexible suction tube assembly, permitting adjustment in any position.



Torit Dust Collectors are designed to meet standard and special dust collecting problems. Compact and self-contained, they fit all production layouts. They are available for immediate delivery in sizes up to 5 H. P. For complete details and the latest *Torit* catalog, write

TORIT MANUFACTURING CO.

296 Walnut Street

St. Paul 2, Minn.

The Watson-Stillman Co., 225 Aldene Rd., Roselle, N.J. The machine, which has a 54-inch clearance between bars and a stroke at each end of 26 inches, is available in 400 and 600-ton sizes that are said to allow for the demounting of all freight, passenger, locomotive tender, and truck wheels at a set-a-minute rate.

An outstanding advantage claimed for the press is its ability to demount Diesel wheels on a production basis without disturbing the drive gear. A special beam available as extra equipment can be used to remove passenger car wheels without pressure being brought to bear on the Spicer drive. Single station push-button controls are used to initiate all move-

ments of the press. Rapid traverse is provided for all idle portions of the stroke, and positive overstroke protection is afforded to prevent cocking of rams in service.

The Watson-Stillman Demounting Press can also be used for mounting car wheels and axle assemblies.

Brown & Sharpe Polishing and Finishing Machine

Described as extremely advantageous for general all-around use where polishing, filing, burring, and similar operations are required on small parts, the Brown & Sharpe Polishing and Finishing Machine shown herewith has been brought out by the Brown & Sharpe Mfg. Co., Providence 1, R.I. The machine is claimed to be particularly useful for hand tooling, polishing the heads of screws, removing cut-off teats, and all burring operations necessary in connection with parts produced on automatic screw machines.

According to the manufacturer, the convenient height of the machine permits the operator to either sit or stand in performing his work. The spindle is provided with three speeds of 4,500, 3,280, and 2,380 r.p.m. and is driven by a V-belt from a ½ h.p. motor. The control of the collet and brake by a foot pedal provides for the simultaneous opening of the collet and stopping of the spindle, thus leaving both of the



It's easy! The Perfex Radius Dresser is as simple to set as a "mike." Hardened and ground micrometer screw permits precision setting throughout the full range—from 2" convex to 2" concave. Take reading directly from micrometer head—eliminate height gauges, "mikes" and errors—gain simplicity, accuracy, hours of time. Simple as A B C; set your diamond to Master Setting Block furnished—then operate same as micrometer.

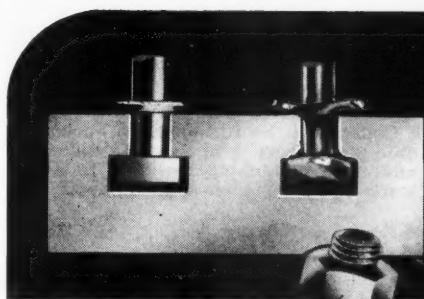
The Perfex Radius Dresser will dress

concave radii smaller than .050"—full 180°. Dressing head is graduated each 5°, equipped with stop dogs to permit dressing within given arc. One revolution of mike screw moves diamond .025", providing rapid adjustment. It's a precision instrument, manufactured by gage makers mindful of tool-makers' requirements. Durable carrying case with Master Setting Gage and provision for our standard diamond tool and attachment for small concave radii.

\$149⁰⁰ complete with hardwood case and attachments.

Perfex GAGE AND TOOL CO.

121 AVERY STREET • MT. CLEMENS, MICH.



Protect This VITAL PART of Your Machines!

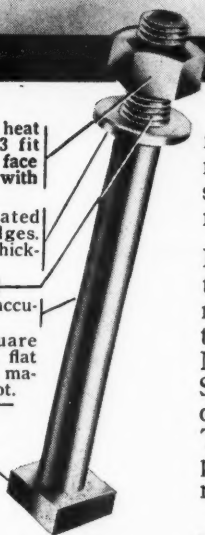
NUT of alloy steel, heat treated with Class 3 fit thread, and washer face commercially square with threads.

WASHER heat treated steel, chamfered edges. Ground to uniform thickness and hardened.

THREADS Class 3 fit.

SHANK ground for accuracy.

HEAD Machined square with shank. Square, flat surface of head fits machined surface of T-Slot.

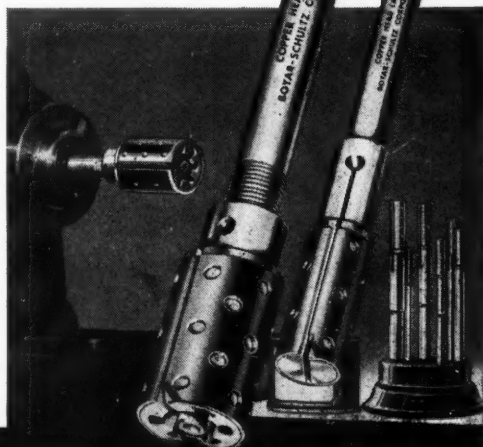


It is cheaper to use precision made bolts than to repair expensive machines. Poorly made bolts of soft steels can quickly ruin the accuracy of a machine.

Boyar-Schultz S. M. B. Bolts are made to protect the T-Slot. They are precision made from upset alloy steel forgings and threaded for a Class 3 fit. Use S. M. B. Nuts and Washers with S. M. B. Bolts for firm, delicate adjustments. They hold work in exact position for heaviest machine cuts.

BOYAR-SCHULTZ Copper Head Laps

Economy and accuracy are the outstanding features of Copper Head Laps. They work rapidly. Only the replaceable copper sleeves wear out. Sleeve adjustment permits maintaining correct lapping size till worn out when it is replaced with a new one. Save costly tool room time. Available from stock in standard sizes, $\frac{1}{8}$ " to $2\frac{1}{2}$ " Diameters.



BOYAR-SCHULTZ CORPORATION

2120 WALNUT STREET

CHICAGO 12, ILLINOIS

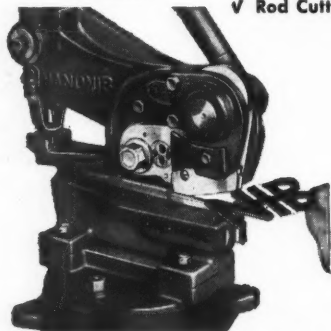
2 TIME SAVERS



This Amazingly Fast Drill Press Vise May Also Be Used as a Base Structure for Dies & Fixtures. This unique screwless vise provides instantaneous, effortless setting. Patented gripping mechanism guarantees positive locking. Wide clearance between guide bars permits clear-through drilling. Built-in parallels save leveling time. Write for folder.

USE HEINRICH HANDNIB No. 5 for

- ✓ Outside Nibbling
- ✓ Inside Nibbling
- ✓ Shearing
- ✓ Punching
- ✓ Rod Cutting

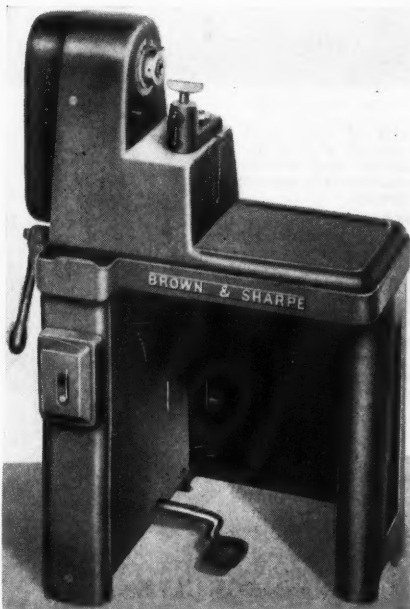


A five-in-one "handyman" which nibbles (outside and inside), shears, punches and cuts rods. Eliminates hours of tedious hand-work. Quickly, easily cuts templates and trial blanks in any desired shape. Takes up to $\frac{1}{8}$ " flat stock. Also $\frac{3}{8}$ " round stock. Write today for illustrated folder.

NATIONAL MACHINE TOOL COMPANY
DEPT. 118-L • RACINE, WISCONSIN

operator's hands free to load the work, perform the operations necessary, and remove the work. The outside of the work spindle is threaded to take a small chuck or other fixtures that may be required.

Collets can be furnished to accommodate stock from $\frac{1}{8}$ to 1 inch in diameter, and the machine is designed to swing work up to $9\frac{1}{4}$ inches in diameter over



Brown & Sharpe Polishing and Finishing Machine

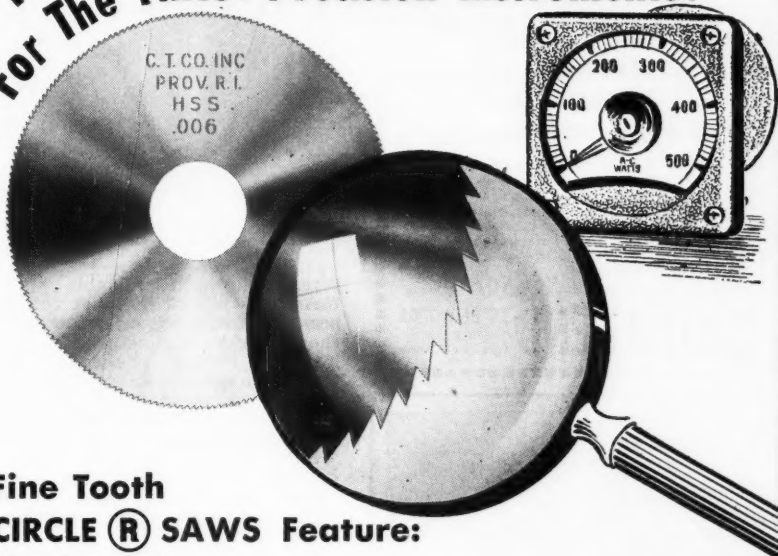
the bed and $7\frac{1}{4}$ inches in diameter over the tool rest. The weight of the machine is approximately 340 pounds.

"Dustkop" Model 335 Dust Collector

Designated as the "Dustkop" Model 335, a portable self-contained dust collector for collecting dust from small wheel grinding and sanding operations and lint from buffing and polishing operations has been placed on the market by the Agat-Detroit Co., 410 Main at Washington Sts., Ann Arbor, Mich. Designed for continuous dust collecting work on production

CIRCLE **R** SAWS

The Finest Teeth
For The Finest Precision Instruments!



Fine Tooth CIRCLE **R** SAWS Feature:

30 teeth per inch
1" to 6" diameters

Thickness .006 in standard sizes; furnished in .003 up to 1½" diameter as specials.

Throughout American Industry these CIRCLE **R** SAWS have provided for years the delicate precision necessary for producing fine measuring, indicating and control instruments.

CIRCLE **R SAWS**
The "Standard" of Saw Quality

CIRCULAR TOOL CO., INC.

PROVIDENCE 5, R. I.

Chicago • Philadelphia • New York • Dayton • Cleveland
Los Angeles • Rochester • Indianapolis • Detroit
St. Louis • Minneapolis

operations, the unit measures 12 x 14 x 18 inches high, thus permitting it to be readily installed on or under a bench. Its lightweight (43 lb.) is said to be ideal where portability is essential.

A rating of 320 c.f.m. at 1½-inch water lift on the 3-inch collector inlet is developed by a continuous duty 3,600 r.p.m. ¼ h.p. motor direct driving a self-clearing paddle wheel fan of special design. After passing through the fan, the dust-laden air is directed over the surface of the dust collecting tray, which consists of a series of baffles to separate out the lint, chips, wire, and heavier dusts. A



"Dustkop" Model 335 Dust Collector



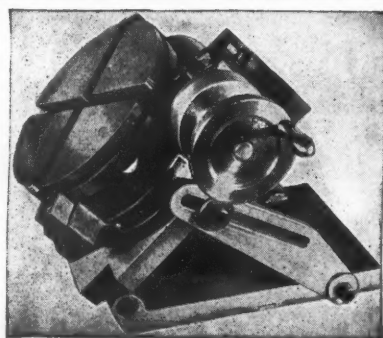
Cutter Bit Grinding Gauge

This gauge eliminates guesswork when grinding cutter bits. Every necessary angle, including rake can be checked. Made of stainless steel. Size 1-7/8" x 2" x 1/16".

PRICE **50¢** POSTPAID

SOUTH BEND

LATHE WORKS
427A E. Madison St.
South Bend 22, Indiana



5 IN. ROTARY TABLE ON ADJUSTABLE ANGLE PLATE

for
SMALL and FINE CIRCULAR MACHINING
CAN BE PURCHASED SEPARATELY
Accurate — Dependable

Write for Bulletin
We Also Make Four Larger Sizes.

JOHN B. STEVENS INC.

482 Canal Street

New York 13, N. Y.

filter of non-inflammable spun glass forms the top of the dust collector and provides for a second-stage cleaning of the air before it is returned to the working area. Periodic shakedown of the filter can be quickly effected by means of a hand crank mounted on the side of the cabinet. Immediately below the crank is a quickly removable dust tray.

Supplied complete with motor for operation on 110 volts, single-phase, 60-cycle a.c., the Dustkop Model 335 Dust Collector is available with a selection of inlet connections.

Palmer-Shile Barrel Truck

Especially designed to speed up barrel and drum handling, a barrel truck weighing 85 lb. and said to readily accommo-

MIRACLE "BENCH KING"

The Revolutionary Vise in Solid Bronze—With Fingers—Gives You An Extra Hand! Comp. With Accessories, **\$14.95**

NOW . . . Our new Model No. 65 for hobbyist or professional, Less Accessories!

FREE! Send for our catalogue.

Remit with order.

We prepay postage.



Dealers inquire

Benj. Uydess & Sons, 960 E. 167th, Bronx 59, N. Y.

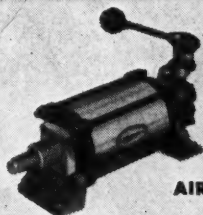
**These
Inexpensive Air
Powered Units Can
Double the Output
of Standard
Machine Tools**

PRODUCTION of such standard machines as drill presses, tapping machines, milling machines, etc., is frequently more than doubled by the use of inexpensive Bellows "Controlled-Air-Power" Devices.

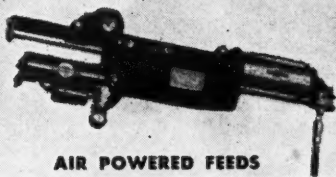
These small, compact, versatile power feeding and holding units replace manual feeding and clamping in a whole host of operations . . . make hand fed and hand clamped machines fast, automatic units . . . actually pay for themselves with the first few days of added production.

If you're looking for ways to make your operations more profitable, learn more about Bellows "Controlled-Air-Power" Devices.

Write today for our new Foto Facts File, The Bellows Co., 220 W. Market St., Akron, O.



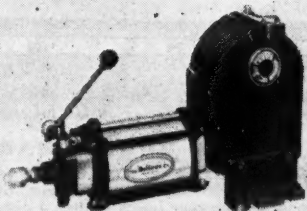
AIR MOTORS



AIR POWERED FEEDS



ROTARY FEED TABLES



COLLET CHUCKS



AIR POWERED VISES

The Bellows Co.

AKRON, OHIO



Palmer-Shile Barrel Truck

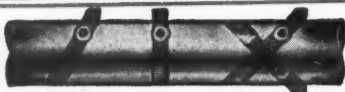
date loads up to 1,000 lb. has been announced by the Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich. To load, the truck is simply shoved up against the barrel or drum, a sliding steel catch dropped down over the barrel rim, and

the truck handle pulled toward the operator, the truck being automatically loaded without any further manual effort.

Sturdily constructed of heavy steel tubing and fabricated steel plate firmly welded for maximum strength and durability, the Palmer-Shile Barrel Truck has a maximum width of 22 inches, thus permitting complete accessibility in crowded aisles, and narrow doorways. The truck can be equipped with pneumatic, rubber, or metal wheels.

Schauer Type VA4BC-A Variable Speed Lathe

Useful in industries where large, round parts must be polished, deburred, or otherwise finished, the Schauer Type VA4BC-A Variable Speed Lathe illustrated herewith is now being produced by the Schauer Machine Co., 2060 Reading Rd., Cincinnati 2, Ohio. The part to be finished is held on the machine spindle by means of a chuck, faceplate, or special fixture and is revolved during the finishing operation at a speed best suited to the part and the nature of the operation. Spindle speeds in a ratio of 6 to 1 from a low of 100 r.p.m. to a high of

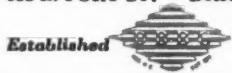


A BETTER BORING BAR

OUR fine list of Customers is PROOF that our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life especially with tungsten Carbide. We also make bars for our Type B and Type C cutters or a combination of tool bits and cutters. Bars are made to suit customers' requirements as to method of drive, pilot, number of holes, angle of bit, etc. Our two-bladed cutters can be floated in the bar or held rigidly. Cutters are interchangeable—hence can be ground in an arbor in the tool room and only require a few seconds for inserting in the bar.

Square hole sizes range from $\frac{1}{8}$ " up to and including $\frac{1}{2}$ ".

THE DETROIT BORING BAR CO.
688 E. FORT ST. Detroit 26, Mich.



TYPE "B" AND "C" CUTTERS

Suitable for Tipping With Tungsten Carbide



"B" A strong rigid serrated 2-bladed cutter—located in the bar with a taper pin. Bore holes accurately to close limits. Can be expanded and reground giving long life. Sizes $\frac{1}{8}$ " dia. up to 6".



"C" A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded.



Fits other bars with slots
 $\frac{1}{8}$ " x $\frac{1}{8}$ "
 $\frac{1}{4}$ " x $\frac{1}{4}$ "
 $\frac{3}{8}$ " x $\frac{1}{2}$ "
 $\frac{1}{2}$ " x $\frac{3}{4}$ "





You know that Multiple Drilling slashes production costs. But do you know that the

THRIFTMASTER "Universal"

IS THE

Highest Quality

Lowest Price

2-6 Spindles
from \$158.00

Immediate Delivery

UNIVERSAL DRILLHEAD

TWENTY-FIVE YEARS of drillhead engineering experience is built into the rugged power of Thriftmaster heads. Quantity production, combined with modern equipment and skilled craftsmanship result in minimum prices. Check these important features:

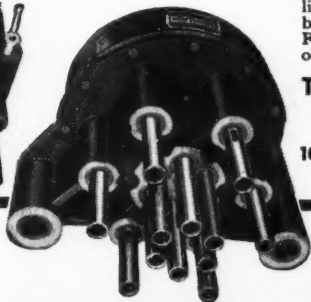
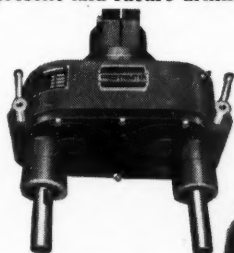
The superior construction of these versatile tools marks them as the outstanding investment for your present and future drilling jobs.

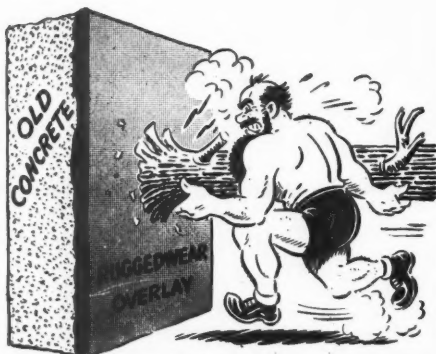
- Adjustable to any hole pattern
- Fits any drill press
- Close center distance Settings
- Maximum flexibility
- Proven performance
- Long life at full rated capacity

Write for name of our distributor in your area and for literature on Thriftmaster full ball-bearing Adjustable or Fixed Center Drillheads. No obligation, of course.

Thriftmaster Products Corporation

1034 N. Plum St., Lancaster, Pa.





TOUGH FLOOR RESURFACER

**Makes Solid Patches
or Complete Overlay**

Use tough RUGGEDWEAR resurfacer over wood or concrete floors. Here is a material which will stand up under the most punishing traffic conditions. Simple to install—there is no chopping or chipping required. You merely sweep out the spot to be repaired—mix the material—then trowel it on. Holds solid and tight right up to irregular edge of old concrete. RUGGEDWEAR provides a firmer, tougher, smoother, and more rugged wearing surface. Used indoors or out. Dries fast.



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FLEXROCK Co.,

3615 Filbert St., Philadelphia 4, Pa.

Offices in Principal Cities

Please send me complete RUGGEDWEAR information . . . details of TRIAL ORDER PLAN—no obligation.

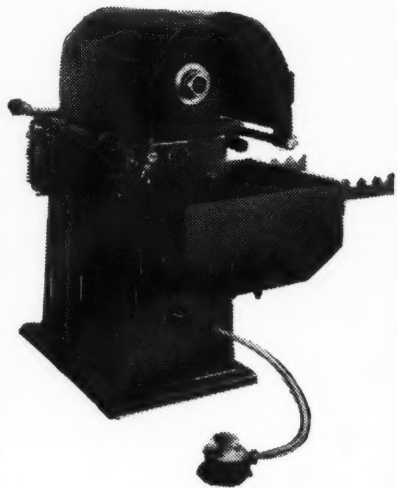
Name

Company

Address

4,800 r.p.m. are obtainable when a single-speed motor is used. This ratio is increased to 12 to 1 when a two-speed motor is used. Spindle speeds are controlled through a heavy duty Reeves variable speed drive.

To provide maximum protection to the operator, the Type VA4BC-A is equipped with a hood which must be drawn forward over the work before the machine can be started. Control is provided by an electrically operated solenoid valve actuated by a limit switch which, in turn,



Schauer Type VA4BC-A Variable Speed Lathe

is operated by movement of the guard hood. With the hood back and the work uncovered, the foot switch which controls the starting and stopping of the machine spindle is disengaged. When the hood is drawn forward and the work-piece is covered, the electric circuit through the switch is energized, and pressure on the switch provides for starting of the spindle rotation.

With the above described arrangement, the spindle can be started and stopped at will so long as the hood is in the forward position. Thus, the operator may stop the machine and examine the work when necessary. With the guard back, accidental contact with the foot switch cannot start the spindle, thereby assuring safety to the operator during the loading and unloading operations. A drip pan, fitted with a rack for holding the polishing rods, is included as standard.

THE *new*
JOHNSON
MODEL "B"
METAL CUT-OFF
BAND SAW



It's NEW, smaller, handier

New shops with smaller, lighter cutting needs can get all the benefits of fast, continuous band saw cutting. The new Johnson Model "B" brings these advantages at low cost in a handy, smaller machine with capacity for 5" rounds and 10" flats. Weighing only 235 pounds, uncrated, this saw can be easily moved from job to job, anywhere. It's right for a variety of metal cutting jobs or for fast, mass production work . . . Structural features include a three point base to assure rigidity and stability regard-

less of uneven floors, and three blade speeds of 45, 90 and 150 feet per minute. And changing blades is quick and easy in this new versatile Johnson. Ask your dealer to demonstrate this saw now.



JOHNSON

MANUFACTURING CORP.
620 CHRYSLER BLDG.,
NEW YORK 17, N. Y.

Roy Model 190-H Thread Rolling Machine

Featuring simplicity of design which facilitates setting up, a high speed thread rolling machine designated as the Model 190-H is now being manufactured by the Roy Manufacturing Co., Webster, Mass. Said to provide a production rate of from 110 to 150 pieces a minute using standard size dies of the flat type, the machine is designed to roll threads on a wide range of machine screws, gimlet point screws, self-tapping screws, and wood screws from No. 2 to No. 10 wire size.

STOP TOOL CHATTER



ELK TOOL HOLDERS, Precision Built, eliminate bit vibrations. Universal—Straight, Right or Left Hand Positions. ONE will replace TEN single purpose Tool Holders.

Write for Bulletin

ELK TOOLS, Inc.

71 W. Broadway

New York 7, N. Y.

The unit includes a larger hopper with fully automatic feed, as well as a slide and pitman which are frictionless pres-



Roy Model 190-H Thread Rolling Machine

sure lubricated. All rotating parts of the machine are arranged to operate in frictionless bearings.

Lyon-Raymond Model 66 Sheet Feeding Table

The Lyon-Raymond Corp., 6224 Madison St., Greene, N. Y., has designed a 10,000-lb. capacity sheet feeding table with a 16-inch range of elevation. Designated as the Model 66, the table has a top 36 inches wide x 66 inches long. Side extensions can be provided which will in-

THE MAC REVOLVING CENTER



Write for literature to

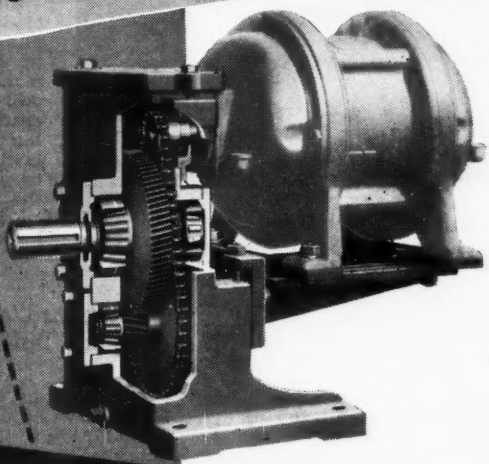
THE WHITFIELD MFG. CO.,

WASHINGTON C. H., OHIO

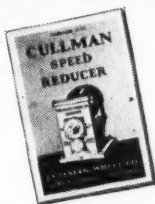
The only revolving center that aligns itself with use. Adapt MAC for your external grinding, runs dead true at all times. Any type shanks made to your specifications, at a small additional cost, other than Morse Taper. MAC is made for wood and metal turning, revolving stops and straight shanks for turret lathes.

No. 2 to No. 4 Standard Morse Taper shank prices range from \$9.75 to \$35.00.

Wider Production Facilities



CULLMAN SPEED REDUCERS



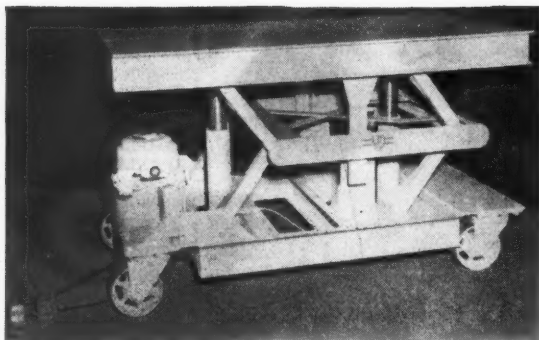
Write Today!—ask for your copy of the useful Cullman Speed 24 page Reducer Book. It is replete with blue prints, photographs and numerous tables of ratings, and prices to promote quick selection and delivery.

The wide range of Cullman speed reducers— $\frac{1}{4}$ to 15 H.P.—provides the ideal size and type for most requirements. They enable you to achieve far wider production facilities for existing motor equipment.

Cullman drives, single and double reduction, are equipped with roller or ball bearings and sturdy helical gears, all moving mechanism operating in oil. Flange type motors are directly connected to the reduction case.

CULLMAN WHEEL COMPANY

1352V ALTGELD STREET • CHICAGO 14, ILLINOIS



Lyon-Raymond Model 66 Sheet Feeding Table

crease the width to 48 inches, and end extensions are available which will extend the length to 96 inches.

The table has a lowered height of 26 inches and an elevated height of 42 inches so that the top of the pile can always be maintained at press bed height until the last sheet is handled. The table is portable and can be loaded in a storage area and maneuvered into place by an industrial power truck for which a towing eye is provided. Two 8-inch swivel casters with Timken bearings provide for easy

optional $\frac{3}{4}$ h.p. motor-driven pump with foot operated switch.

"Standard" Jackshaft Variable Speed Buffing and Polishing Machine

The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, announces the addition to its line of infinitely variable speed buffing and polishing machines

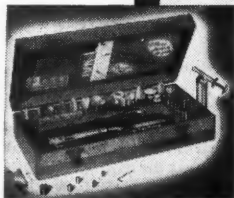
Speed—POWER—PRECISION

40,000 R.P.M.—1/5 H.P.

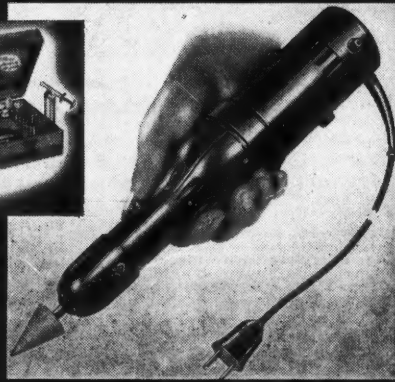
Built for production. PRECISE 40, the fastest, most powerful electric handtool made, weighs only 40 oz. Use on any material from file-hard steel to bronze, plastics, wood or rubber. Imagine, with tungsten carbide cutters PRECISE 40 mills the hardest steel!

PRECISE 40 in cool, shock-proof, plastic case operates on AC-DC. Use it as a handtool or as a motorized quill in vise, lathe, mill or on your production set-up. Many accessories and rotary tools available. Also COOL-FLEX Flexible Shaft attachment with 9-oz. air-cooled handpiece.

► WRITE FOR BULLETIN



GRINDS
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DEBURRS
ENGRAVES
POLISHES
FINISHES



PRECISE 40

PRECISE PRODUCTS COMPANY

1345 CLARK STREET • RACINE, WISCONSIN

WHYTE

ENGINEERING CO.

"Series 600"

WHYTE ROLL FEEDS

*for Fast, Accurate
Continuous Feeding*

- MODELS AVAILABLE TO
FEED FROM 0" TO 6"
AND UP TO 14" WIDE
- RUGGED WELDED
STEEL CONSTRUCTION
- TIMKEN ROLLER
BEARINGS
- ALL CUT STEEL
GEARS
- EASILY ADJUSTED
TO PROPER DIE
HEIGHT
- SINGLE AND
DUAL FEED
AVAILABLE

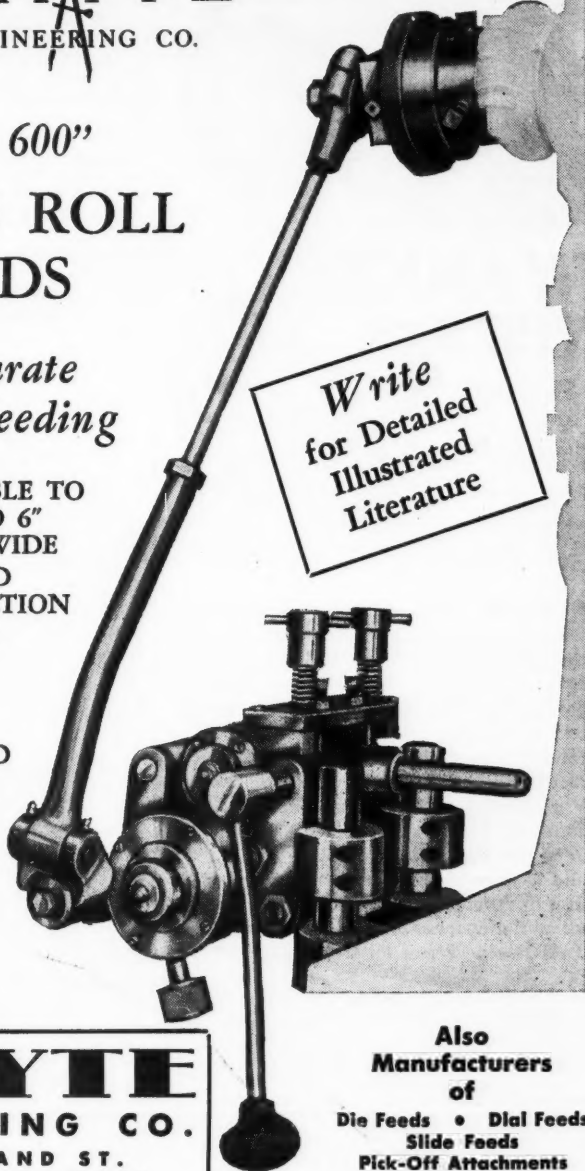
★

*Immediate
Delivery*

WHYTE
ENGINEERING CO.

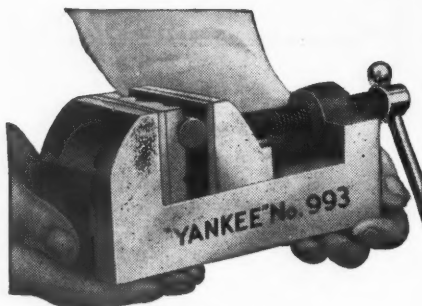
185 ROWLAND ST.
SPRINGFIELD 7, MASS.

*Write
for Detailed
Illustrated
Literature*



**Also
Manufacturers
of**

Die Feeds • Dial Feeds
Slide Feeds
Pick-Off Attachments
Stock Straighteners
Lamination Dies



"YANKEE" VISES

*hold the
work*

all the way through



● With a "Yankee" Vise you align the work just once, no matter how many steps the job takes. Lifts on and off a swivel base. Use it on the swivel base for bench work. When removed, it is ready for use on milling machine, or drill press. Accurately machined top, bottom, sides and front end. Makes handy, economical jig. V-grooved block for round stock. Four convenient sizes of "Yankee" Vises, with or without swivel base... $1\frac{1}{2}$ ", 2", $2\frac{3}{4}$ " and 4" jaw widths. Your industrial distributor has them. Full details about these and other handy shop tools in the "Yankee" Tool Book. Write for it today.



V-grooved block

YANKEE TOOLS NOW A PART OF

STANLEY

Reg. U.S. Pat. Off.

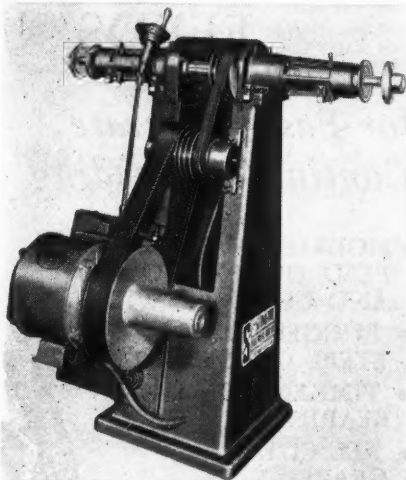
THE TOOL BOX OF THE
WORLD

NORTH BROS. MFG. CO.

Philadelphia 33, Pa.

of a unit with jackshaft construction which permits an infinite low-speed range or a 2-in-1 arrangement to provide both a low-speed and high-speed range. The machine is available in two types designated as the 3VJ2 and 3VJ. With the Type 3VJ2 (illustrated herewith) an infinite speed range of from 600 to 3,600 r.p.m. is available. The Type 3VJ is similar to the Type 3VJ2 but is furnished only for an infinite low-speed range which can be of any 2-to-1 ratio; for example, 600 to 1,200 r.p.m., 700 to 1,400 r.p.m., and so on.

The Type 3VJ2 is shown equipped with



"Standard" Jackshaft Variable Speed Buffing and Polishing Machine

a 3 h.p. motor, enclosed spindle, and four ball bearings. It is also available in 1 and 2 h.p. sizes and optional with two ball bearings and open spindle construction.

Denison Midget Multipress with Pumping Equipment

Known as the Midget Multipress, a multi-purpose oil-hydraulic press of 2,000-lb. capacity, complete with its own pumping equipment, is now being manufactured by The Denison Engineering Co., 1160 Dublin Rd., Columbus 16, Ohio. The ram stroke, ram speed, and ram pressure of the machine are all easily regulated by controls at the operator's finger tips. Ac-

Why a *Commander* Tapper?

- **Tapping capacity** 0 to $\frac{3}{4}$ " with one tapper.
- **Torque control**—may be adjusted to protect any size tap. This assures safe bottom-hole tapping.
- **Spring clutch** drive eliminates slippage and wear . . . provides smooth, quiet, positive operation.
- **Compactly built**—affords maximum visibility of tapping operation.
- **Furnished to fit any Drill Press.**



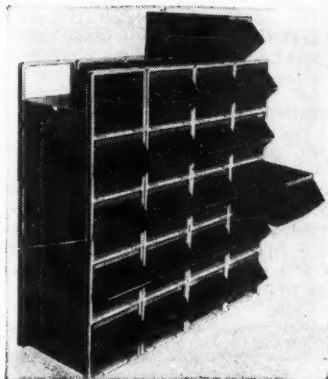
**One COMMANDER
TAPPER handles
the range #0 to $\frac{3}{4}$ "**

*Write for circular and name
of your nearest Distributor.*

COMMANDER MFG. CO.

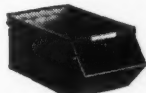
4224 W. Kinzie Street Chicago 24, Ill.

Product of *Commander* . . . Builder of the *Multi-Drill*



**STACKBINS
IN
STACKRACKS**

REDUCE HANDLING of Tools, Parts and Materials



STACKBINS are individual hopper-fronted stacking bins, designed for storage, transportation and assembly of tools, parts and materials.



STACKRACKS are individual units which lock together to form racks of any size, shape or capacity. Stackbins slide like drawers in Stackracks.

Because Stackbins are portable containers—not fixtures—tools, parts and materials can be carried to departments, from machine to machine, or held in stockrooms without being transferred from one container to another. Stored in Stackracks, any Stackbin is instantly accessible when its contents are needed—without disturbing any other bin.

*Manufactured and sold in Canada exclusively
by Walter H. Wickware, Ottawa*
Write Stackbin Corp., 1083 Main St., Pawtucket, R. I.

STACKBIN

"Stacked and

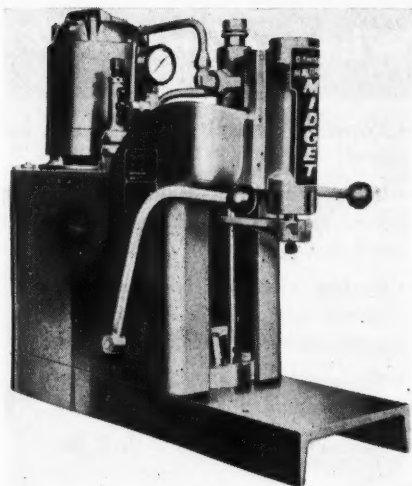


Still Accessible"

SYSTEM

cording to the manufacturer, the Midget can be switched rapidly from one job to another, due to its highly versatile control and the ease with which tooling can be changed.

Measuring 13 x 30 x 29 $\frac{3}{4}$ inches overall and weighing 270 lb., the Midget can be easily moved anywhere in the shop. Its small size is said to make the press ideal for use in batteries, for successive operation requirements, with all units independently controlled and operated. The machine can be adapted to other hydraulic machinery as an accessory unit, and may be readily operated in any position



Denison Midget Multipress with Pumping Equipment



ATLANTIC For GEARS

Our service on small gears, due to new equipment recently installed, will interest you. Send samples or blueprints for quotation.

ATLANTIC GEAR WORKS, INC.

198-A, Lafayette St., N. Y. 12, N. Y. CAnal 6-1441

required to suit the convenience of the user.

The oil-smooth HydroILic action provided by the Denison Midget Multipress is said to exert the same exact preset pressure selected for the work regardless of size variations in the parts. Designed to provide for high, reject-free production with unskilled operators, the press is so arranged that the operator must depress two levers, one with each hand, before the ram will descend, thus ensuring that the hands are away from moving parts. The machine has a ram stroke of 6 inches, throat depth of 4 $\frac{1}{2}$ inches, daylight opening of up to 15 $\frac{1}{2}$ inches, and ram speed of 600 inches per minute up and 400 inches per minute down.

LOUVRES BY *Littleford*

If newly designed units need Louvers to supply ventilation for motors or engines or your present machines need ventilation for better performance, Littleford can produce these Louver Covers at an amazingly low cost. If you have a problem involving Louvers, send blueprints to Littleford; see how you too can save on this intricate work.



LITTLEFORD

LITTLEFORD BROS., Inc.

433 E. Pearl St., Cincinnati 2, Ohio

MILL IT ON YOUR LATHE

PALMGREN MILLING ATTACHMENT



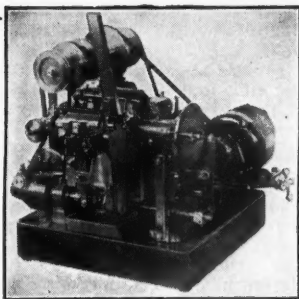
Convert Lathe in 10 Seconds

Mill, slot, grind, groove, square shafts, recess—on lathe. Shops, schools, homes need this fixture. Fits Craftsman, Atlas, So. Bend, Logan, Sheldon, Perkins. Accurately graduated for rotary and vertical feed. No. 150, 1 $\frac{1}{2}$ " Jaw \$18.75; No. 250, 2 $\frac{1}{2}$ " Jaw \$24.75; No. 400, 4" Jaw \$39.75.

No. 250
\$24.75

Write for Circular No. 10.

CHICAGO TOOL and ENGINEERING CO.
8399 South Chicago Ave. Chicago 17, Ill.



WALTHAM

Pinion and Gear Cutting Machines

with revolving cutter will make 1, 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to $1\frac{1}{2}$ " dia. Blanks are held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut. Write for Bulletin No. 112.

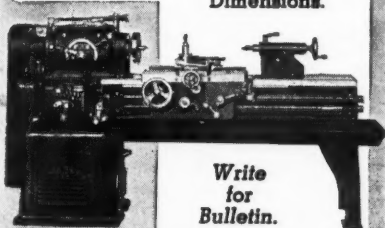
WALTHAM MACHINE WORKS

WALTHAM MASS.

Pinion and Gear Cutting Machine, Thread Milling Machine, Cylindrical Sub-Presses, Cutter Sharpening Machine, Small thread milling and gear cutters, Small special machinery.

CARROLL AND JAMIESON LATHES

16"



12 Speed Geared
Head Motor Drive
Timken Mounted
Spindle.

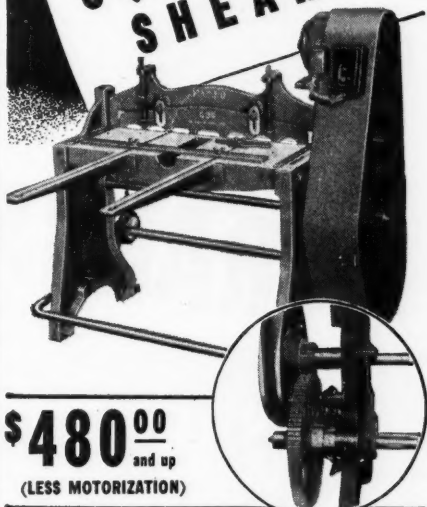
Modern Design—
Liberal
Dimensions.

Write
for
Bulletin.

THE CARROLL & JAMIESON
MACHINE TOOL CO.

KATAVIA, OHIO, U.S.A.

New! famco Power SQUARING SHEARS



\$480⁰⁰
and up
(LESS MOTORIZATION)

Rear View of Power Drive Mechanism (Guard Removed)

QUALITY FEATURED AT A NEW LOW PRICE

- Saves equipment investment for departments and shops doing light work.
- Low initial cost . . . economical to operate.
- Sturdily built throughout . . . powerful gear drive. Cuts up to 18 gauge mild steel.
- Has non-repeat (single-stroke) mechanism, easily set for continuous operation when desired.
- Inlaid, precision-ground high carbon tool steel blades regularly furnished. High speed blades available at additional cost.
- Easily adjustable front and back gauges, hold-down, and guard furnished as standard equipment.
- Three sizes . . . 36", 42" and 52" cutting widths.

This new Power Shears is the latest addition to the Famco Line of cost cutting machines, intended to meet the growing demand for lightweight, low-cost power machinery. For information about the complete Famco Line, write to—

FAMCO MACHINE CO.
1324 RACINE ST. • RACINE, WISCONSIN

famco COST CUTTING **machines**

ARBOR PRESSES • FOOT PRESSES • POWER PRESSES
FOOT SQUARING SHEARS • POWER SQUARING SHEARS

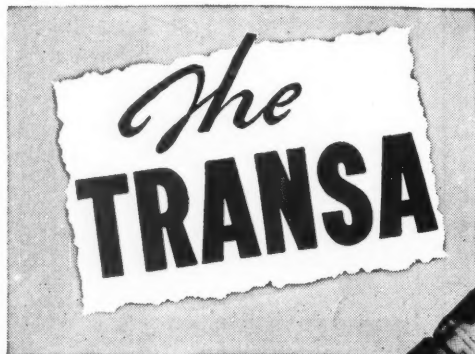
"Temco" Bench Type Electric Furnace

The Thermo Electric Manufacturing Co., 488 W. Locust St., Dubuque, Iowa, announces the addition to its line of "Temco" electrical equipment of a bench type electric furnace for laboratory uses and the heat treating of carbon and high chrome steel parts and tools. The furnace is available in six sizes having chamber dimensions ranging from 4 inches wide x $3\frac{1}{2}$ inches high x $4\frac{1}{2}$ inches deep to $8\frac{1}{2}$ inches wide x $7\frac{1}{2}$ inches high x 18 inches deep.

According to the manufacturer, the furnace is fast heating and may be operated at a temperature up to 1,650 deg. F. for continuous use and to 1,900 deg. F. for short periods. The heavy gauge high quality nickel-chromium heating elements used in the furnace are said to have a very low ratio of watts per square inch of heating surface, thus assuring long life. The elements are embedded in refractory plates which form the sides, top, and bottom of the heating chamber, thereby protecting the elements from physical damage, minimizing oxidation, and providing for even distribution of heat.

it is claimed. The element plates can be easily replaced without dismantling the furnace. The side plates are interchangeable as are the top and bottom plates.

All sizes of the furnace have up-lifting counterbalanced doors except the two largest sizes in which the door is divided horizontally into two sections, thereby permitting the bottom half to be lowered separately and allowing access to the chamber with minimum loss of heat. The furnace body is of welded steel construction with dual insulation from 3 inches thick in the smaller sizes to 6 inches thick in the larger sizes. The two smallest sizes of the Temco Bench Type Electric Furnace each have an indicating pyrometer, pilot light, toggle switch, and Temco meter stepless input controller installed in an instrument panel in the



GUN TYPE SAW



At last, a saw which cuts anything, stainless steel, rubber, wood, aluminum, etc. Blade has a variable speed which is set in 45 seconds . . . the stroke length of the blade is adjustable depending on thickness of materials. Transa has

twice the power on the cutting stroke due to a special gearing arrangement.

Special guides for each width of saw blade eliminate whipping, turning or cracking the blade, and acts as a cutting

guide at the same time. Transa guns are used extensively in machine shops, assembly plants, fabricating industries, repair and shipping departments.

Write for free bulletin.

TRANSA INC.

440-45 Gateway Bldg.
Minneapolis, Minnesota

WHO

makes precision
"milled from the bar" screw machine
products that stand up under hard
usage... and build up sales through
customer demand?

W^mH. Ottemiller Co.,
YORK, PENNA.

... of course!

Write today for the new eye-catching
folder that illustrates and describes
our famous line of ...

CAP SCREWS • SET SCREWS •
COUPLING BOLTS • and MILLED STUDS
in all sizes and threads

MARK and DEMAGNETIZE
IN
ONE OPERATION

THE
Luma
WAY



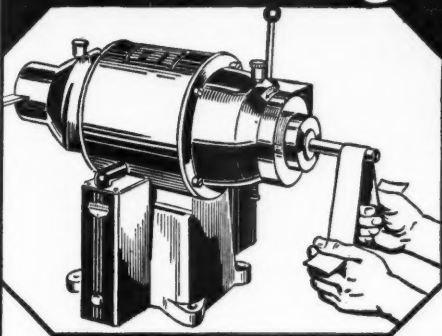
The Luma combination etchtool and demagnetizer, etches, demagnetizes, anneals and solders. Permanently marks hardest steel with ease of a pencil. Write for complete information.

Luma Electric Equipment Co.
P. O. BOX 132-MS TOLEDO 1, OHIO

Cut Polishing Time up to 80%

with

SCHAUER SPEED LATHES

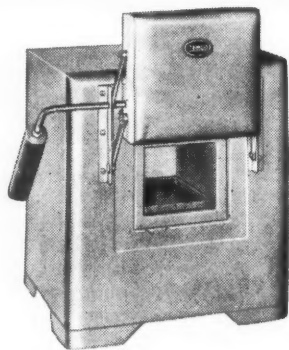


Write for CATALOG 480 showing types
for all secondary finishing operations.

Users report production increases of 50% to 100% over former methods when Schauer Speed Lathes are used to polish, lap, de-burr or finish metal or plastic parts. These high-production machines do the job speedier, better, and at lower cost.

THE SCHAUER MACHINE CO. - Originators of Today's Speed Lathes
2060 READING ROAD • CINCINNATI 2, OHIO

base of the furnace. By adjustment of the Temcometer knob, the current input can be regulated anywhere between 5 and 100 per cent time "on", and any desired temperature from 350 deg. F. to



"Temco" Bench Type Electric Furnace

maximum can be selected and maintained. The Temcometer is said to maintain constant watt-hour input and even temperature regardless of normal fluctua-

tions in line voltage. The four larger sizes of the furnace may be operated by a separate 500 Series Temcometer or by a controlling pyrometer.

Four sizes of the furnace are available for operation on either 115 or 230 volts, 50/60 cycles. The two largest sizes are intended for use on 230 volts only.

Stevens 5-Inch Rotary Table and Angle Plate

A 5-inch rotary table for use by engravers, etchers, and others on bench or small milling machines, drill presses, or grinders is now being manufactured by John B. Stevens Inc., 480 Canal St., New York 13, N. Y. The table section and taper hub are of one piece and both contacting surfaces of same are scraped for a uniform fit on the base and in the taper bore in the base, with a wide flange attached to the lower end of the hub for contact fit to the underside of the base. This construction is said to assure long life of the original fitting.

According to the manufacturer, the design of the Stevens 5-Inch Rotary Table permits a ready means for checking the proper fit of the worm in the gear and

Standardize on Carbide!
Standardize on 

N.T.S. is an important new source for both standard and special carbide tipped tools.

For 34 years N.T.S. has reworked cutting tools for large industries—is thoroughly grounded by long experience in the fundamentals of good H.S.S. and carbide tool design.

The best way to protect your carbide tool investment is to select the most experienced source you can find... **WRITE TODAY FOR OUR NEW CARBIDE TOOL CATALOG!**

CARBIDE TOOL DIVISION

NATIONAL TOOL SALVAGE COMPANY

6511 EPWORTH BOULEVARD • DETROIT 10, MICHIGAN

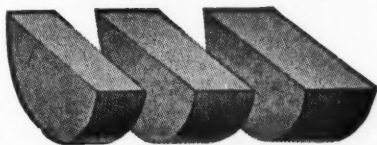
CORE
DRILLS
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REAMERS
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TWIST
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CARBIDE
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SLOTING
CUTTERS
•
DRILL FOR
HARDENED
STEEL
•
END
MILLS
•
FACE &
SHELL
END MILLS





PRECISION • ACCURACY

Woodruff Keys



Machine Keys • Machine Racks
Taper Pins • Straight Pins
Cotter Pins and Other
"Stanho" Steel Products.

**STANDARD
HORSE NAIL CORP.**

NEW BRIGHTON Since 1872 PENNA.

**ITS' HERE! . . . THE NEW
"SAFETY" TYPE
FOR
CLEAR-CUT
MARKING**



**S.T.M.
PRECISION TYPE**

Now . . . your products can be marked clearly, legibly and attractively with this new precision type. Extra deep engraving in sizes from $\frac{1}{32}$ " to $\frac{1}{4}$ " gives beautiful stamping in brass, aluminum, copper, steel, leather or hard rubber. Reverse characters for stamping molds. Made for any holder, press or marking machine.

Write for Complete Data.

M.E. CUNNINGHAM CO.
SAFETY STEEL STAMPS

138 East Carson Street • Pittsburgh 19, Pa.

Buy
KIPP AIR GRINDERS
Because

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind — not just rub. The speed of Kipp air grinders drops but slightly when put to work. That means better work—longer wheel life.

Buy Kipp air tools for best results, lower prices.

**MODEL JA
50,000 R. P. M.**

\$42⁰⁰

IN U. S. A.



Weight 12 ounces;
length 6 $\frac{3}{4}$ inches;
chuck size $\frac{1}{8}$ inch.
Wheel guard re-
moved for better
illustration.

MADISON-KIPP CORP.

208 Waubesa St., Madison, Wis., U. S. A.

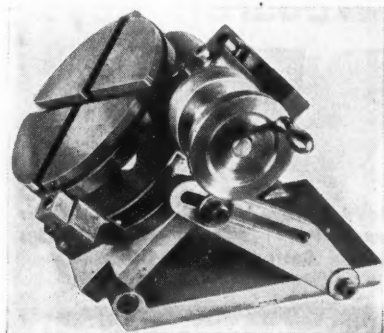
• Skilled in DIE CASTING Mechanics
• Experienced in LUBRICATION Engineering
• Originators of Really High Speed AIR TOOLS

binding, as well as disengaging and re-engaging for free rotation of the table. The ratio of the worm gear is 1 to 72. The periphery of the table is graduated with 360 lines for reading in degrees. An adjustable collar on the worm shaft has 300 lines for 1-minute readings. An oiler located on the side of the table base provides for lubrication of all moving contacts; the worm operates in an oil bath.

Specifications of the table are as follows: diameter of table, 5 inches; height, 2 $\frac{3}{4}$ inches; length of fit on machine table, 7 $\frac{1}{8}$ inches; width of fit on machine table, 4 $\frac{1}{8}$ inches; distance center to handwheel,

4 $\frac{1}{8}$ inches; hole through center, $\frac{5}{8}$ inch; width of table T-slots, $\frac{3}{8}$ inch; width of tongues in underside, $\frac{1}{2}$ inch; and net weight, 17 pounds.

For using the Stevens 5-Inch Rotary Table in an angular position, the com-



Stevens 5-Inch Rotary Table Mounted on Adjustable Angle Plate



**DRILL and
PILOT
BUSHINGS**
Frictionless
—Rotary

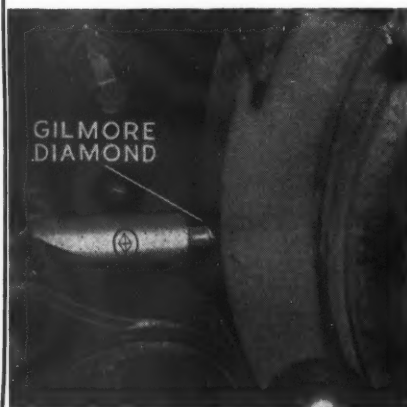
For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch. Write for details.

GATCO ROTARY BUSHINGS CO.

1300 Mt. Elliott Ave.

Detroit, Mich.

GILMORE
DIAMOND TRUING TOOLS



Quality diamonds that render long service, and reduce truing costs. Send for illustrated Cat. No. 45.

F. F. GILMORE CO.

285 Columbus Ave., Boston 16, Mass.

pany has available an angle plate which can be tilted and locked at any angle from horizontal to 70 degrees. Specifications of the angle plate are as follows: height when flat, 1 $\frac{5}{8}$ inches; length fit on machine table, 7 $\frac{1}{8}$ inches; width fit on machine table, 5 inches; width of tongues in underside, $\frac{1}{2}$ inch; extreme tilting angle, 70 degrees; and net weight, 12 pounds.

Paragon Air Conversion Unit

Paragon Metal Products, 844 W. Adams St., Chicago 7, Ill., has announced an air conversion unit designed specifically for converting any of the popular size hand-operated arbor presses into air presses.

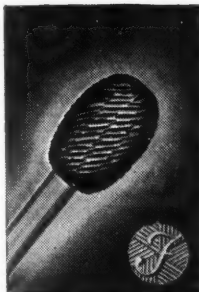
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The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins, Woodruff keys, machine keys and machine racks.

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*for machine shop,
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- Knife edged hardened jaws accommodate thread measurements.
- Accurate measurements to .001".
- Packed in a sturdy leather case.
- Painstakingly machined, American made.

Catalog Number	Size	Scale Graduations	Vernier Reading
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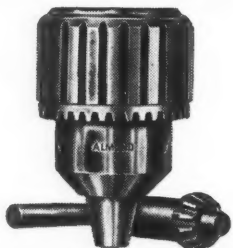
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Long Life.**

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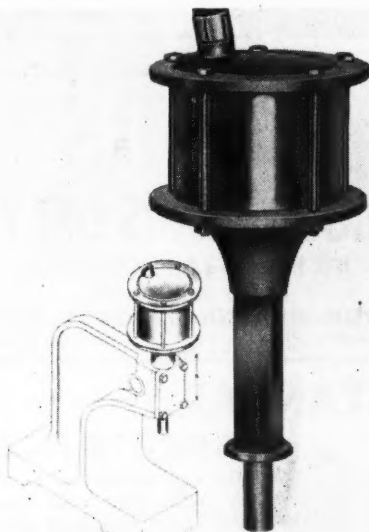
... because they're made of a special, correctly - heated alloy steel. Central striking point assures uniform marking. Thumb side marking assures easy use.

You get more mark per dollar with THOR STAMPS. Write for catalog and prices.

The Pittsburgh Stamp Co., Inc.
812 CANAL ST. • PITTSBURGH, PA.

The unit is supplied complete ready to use and can be quickly installed. After removing the ram retainer plate and ram from the arbor press, all that is necessary to convert it into a ready-to-operate air press is to place the air conversion unit into the ram seat, replace the plate, and connect the unit to the shop air line.

The Paragon Air Conversion Unit is available in models to fit presses having various size and shape rams. Incorporating a 4-inch I.D. cylinder, the unit has



Paragon Air Conversion Unit

a 2½-inch stroke, a ¾-inch ram, and a power factor 12½ times that of the line pressure.

Potter Frequency Measuring System

A precision system which is designed to provide a simple means of measuring frequencies with accuracies of one part in ten million or greater is now being marketed by the Potter Instrument Co., Inc., 136-56 Roosevelt Ave., Flushing, N. Y. According to the manufacturer, measurements with these extremely high accuracies can be made quickly and easily without the need for calibrating, tuning, zero beating, interpolating, or any of the other exacting procedures.



Illustration 1/5 actual size

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44 Wheels and Points

In various grits and standard sizes for cleaning and polishing, plus three mandrels.

All for \$2.50

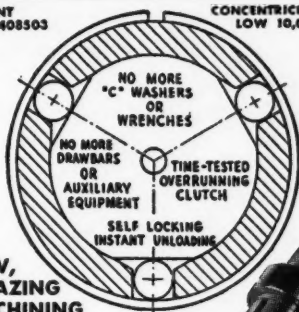
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San Francisco, Calif.

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CONCENTRICITY IN
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MACHINING
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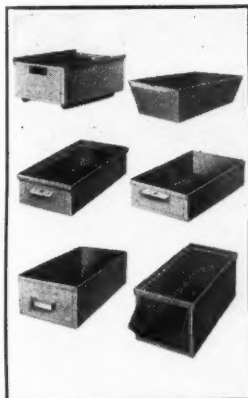
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Curtiss-Wright Corporation ranks our product with their best tools. Cleveland Graphite Bronze Company, leading bearing manufacturer, states new high accuracy reached, plus substantial production boosts.

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18" x 12" x 6". 16 Ga.
with Drop Handles

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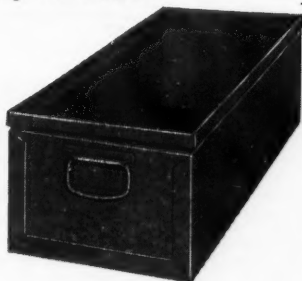
16 x 10 x 6..... 18 Ga.

16 x 10 x 6..... 16 Ga.

18 x 12 x 6..... 16 Ga.

18 x 12 x 8..... 16 Ga.

MADE IN OTHER SIZES

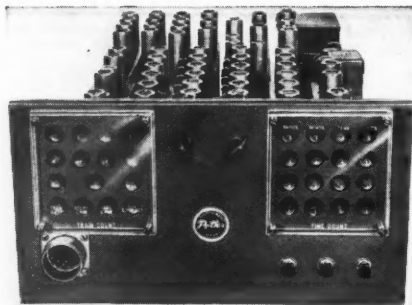


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PROVIDENCE, R. I.



Doppler Frequency Chronograph Utilizing
Potter Frequency Measuring System

The Potter Frequency Measuring System is claimed to be ideal for doppler frequency measurements and similar applications in which only a second or less time is available for making the measurements. Any frequency from 0 to 1.6 megacycle can be quickly and easily measured, it is stated. The system is said to find wide application not only in laboratories where high precision is required but also in various industrial applications

for the precise measurement and control of shaft and roller speeds.

The basic units of the frequency measuring system are two high speed electronic counters, a crystal oscillator, and an electronic switch. These units can be used in two different ways, depending on the accuracy required and the time available for measurement. In the first method, a predetermined sample of the unknown frequency is counted with absolute accuracy; simultaneously, the cycles of a time base frequency are counted in a second counter. The unknown frequency is then found by dividing the sample count by the time interval required to accumulate the selected sample.

In the second method, the cycles of the unknown frequency are counted during a predetermined time interval. The time interval is precisely established by simultaneously counting a selected number of cycles of a time base frequency.

Dayton Rogers Model CBM Pneumatic Die Cushion

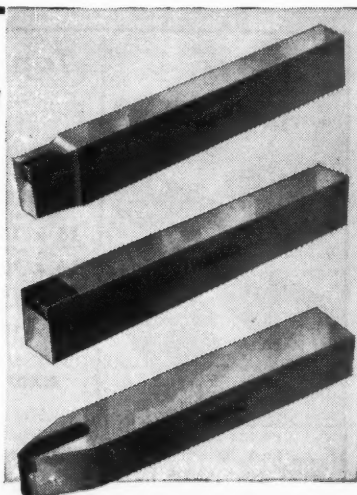
Designated as the Model CBM, a pneumatic die cushion intended primarily for use where four suspension rods carry the

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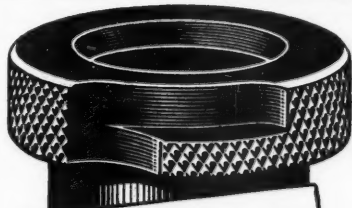
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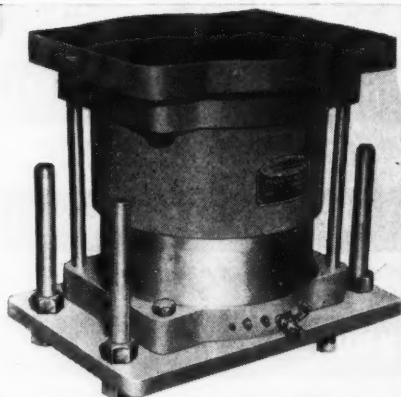
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mounting plate which supports the die cushion cylinder is announced by the Dayton Rogers Mfg. Co., 2824 S. 13th Ave., Minneapolis 7, Minn. This type of installation is said to permit the user to remove the bolster plate without removing the die cushion cylinder.

The hardened and ground pin pressure pad of the Model CBM is machine cut to fit the press bed opening, thus utilizing all of the press bed opening area. Two stop rods are furnished to prevent the cylinder from becoming detached from the lower piston section in the event the air is turned on when the bolster plate is re-



Dayton Rogers Model CBM Pneumatic Die Cushion

moved. The cylinder may be drained from a front pet cock provided with the cushion. Greasing is permitted by special grease fittings at the front of the lower cylinder section.

The Dayton Rogers Model CBM Pneumatic Die Cushion is available in ring holding pressures of from $1\frac{1}{2}$ to 75 tons on 100-lb. air line, and is supplied complete with a combination regulator and gage. A surge tank can be applied when the maximum drawing capacity is required on the die cushion.

Goodwin Motor-Mounted Collet Chuck

According to The Goodwin Manufacturing Co., Cuyahoga Falls 11, Ohio, a recent modification of the quick-acting Goodwin collet chuck adapts it for use

BREMIL

The IMPROVED Compound Lever Shears
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FULLY
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Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.
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Additional files in $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ " and $\frac{1}{2}$ " sizes

Available at \$1.75 each including Holders

Price Complete with One $\frac{3}{16}$ " File and Holder \$29.75 POSTPAID

If additional files are desired add \$1.75 for each file and holder. BE SURE TO FURNISH DIAMETER OF DRILL PRESS SPINDLE QUILL. FULLY GUARANTEED.

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SURFACE PLATE for laying out, etc. Precision ground to .001". 12" x 17" x 3", top $\frac{3}{4}$ " thick . . . **\$37.50**

ANGLE PLATE. Precision ground. 3- $\frac{1}{4}$ " x 3- $\frac{1}{4}$ " x 4- $\frac{1}{4}$ ". . . . **\$20**

V-BLOCKS for holding cylindrical parts. Precision ground. 1- $\frac{15}{16}$ " x 2- $\frac{15}{16}$ " x 2- $\frac{1}{4}$ ". Cap. $\frac{1}{4}$ " to 2" round. Per matched pair . . . **\$32**

Prices f. o. b. factory

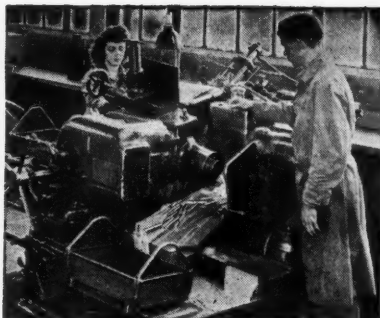
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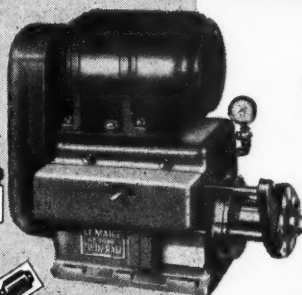
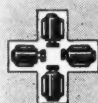


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Designers and builders of unit and way type machines for single or multiple spindle drilling, boring, reaming, tapping, etc.—Twin Ram Hydraulic Units—Match-it Gear Chucks.



Goodwin Motor-Mounted Collet in Use

with any standard electric motor to perform as a simple and economical "lathe" for secondary operations such as deburring, filing, and polishing. This adaptation of the collet chuck varies from its conventional use on toolroom and production lathes, and conversion is accomplished by the addition of a shaft adapter and adjustable stop. A spring ejector can

be provided to speed production work.

The chuck body is made in two parts to facilitate accurate mounting, and is said to operate on a motor shaft without "wobble." Models can be furnished with either straight or tapered holes, depending upon the motor shaft. Solid, sturdy construction and the elimination of unnecessary moving parts are said to assure maximum service life.

The worker shown in the accompanying illustration is inserting small bushings for deburring. A spring ejector is claimed to ensure efficiency and maximum speed on this type of operation, and a quick release feature, standard on Goodwin chucks, allows for chucking of the workpiece without stopping the motor. Positive gripping is afforded by actuation of a small, conveniently located control lever, and powerful pressure is exerted on the workpiece through a multiple leverage principle that utilizes the cantilever action of hardened steel fingers. The threaded nose cap can be easily removed for changing collets and is turned to adjust collet gripping pressure. Adjustments are locked by a key, which engages a spring in the engraved slots on the inner surface of the adjusting collar.

The Goodwin Collet Chuck is available

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PRECISION GROUND FLAT STOCK

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GROUND TOOL STEEL

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in two sizes. The 1-inch capacity model is designed to fit motors having shafts up to $1\frac{1}{4}$ inches in diameter, and has an outside diameter of $3\frac{1}{2}$ inches, overall length of $3\frac{1}{2}$ inches, and a 2-inch overhang. The 2-inch capacity model has a $5\frac{1}{4}$ -inch diameter and $2\frac{1}{2}$ -inch overhang, and is said to fit any motor shaft up to $3\frac{3}{4}$ inches in diameter. Chucks can be supplied with or without motors.

"See-All" Thread Staging Fixture

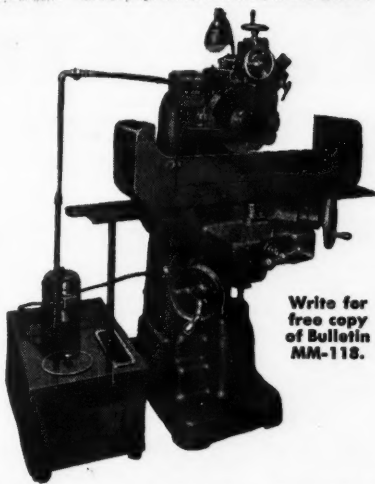
Known as the "See-All," a universal type thread staging fixture for the inspection by optical projection of screw threads ranging in diameter from 0.073 to 1.000 inch is announced by the Engineers Specialties Division, The Universal Engraving & Colorplate Co., Inc., 960 Ellicott St., Buffalo 8, N. Y. The fixture is designed for use on AO optical projection comparators, Kodak contour projectors, Jones & Lamson optical comparators, and Portman Model P.25 comparators. Adapters can be supplied which make the fixture suitable for use on Bausch & Lomb contour projectors and certain other vertical type comparators as well.

The See-All Thread Staging Fixture provides both practical and fast methods of loading and holding screws. When used with ESD coordinated thread chart-gage screens, the pitch diameter, major diameter, minor diameter, crest, flank angle, worn tool allowance, and lead of any screw from 0.073 to 1.000 inch O.D. can be readily gaged. The fixture is claimed to provide an excellent yet simple helix angle adjustment for use on those optical comparators in which no work stage with helix angle is available. Two sets of adjustable V-assemblies are supplied with the fixture, one set for the machine screw sizes from 0.073 to 0.216 inch O.D. and the other set for the fractional sizes from 0.250 to 1.000 inch O.D. The V-assembly is firmly clamped to the base fixture by a quick-acting lock screw. The two assemblies are readily interchangeable.

For the proper positioning of the jaws of the V-assembly, two pins are provided, one in the upper and one in the lower half of the vee. The distance between these pins is specified for each size of screw on a data table supplied. With the aid of a micrometer, the pins are spaced to the proper dimension and the jaws are thereby brought into alignment for holding the screw to be inspected. The center line axis of the screw is automatically

COVEL'S No. 15

*Low Cost
Hand Feed
SURFACE GRINDER*



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MM-118.

This 6" x 18" hand-feed surface grinder is really a double purpose machine. It is equally efficient for accurate tool-room work or for production grinding where fast stock removal is demanded. Big 10" grinding wheel — heavy, three-speed spindle — $1\frac{1}{2}$ H.P. motor, combine to make the No. 15 a tool that will help you materially to increase production and lower costs.

Only \$875.00 F.O.B. Benton Harbor, Mich.
Less motor and controls.

For extra long life, specify chrome-plated table ways. Available at reasonable extra cost.

COVEL MANUFACTURING CO.

BENTON HARBOR, MICHIGAN, U. S. A.

established when using the V-block method.

A set of 25 setting masters is supplied with the See-All Thread Staging Fixture for alignment of the fixture with the coordinated thread charts on the comparator. Nineteen of the set masters are for use with ANF threads and six are for tapered threads. Tapered threads in sizes from $\frac{1}{8}$ -27 to $\frac{3}{4}$ -14 can be inspected with the fixture as a result of the built-in adjustable feature which provides a compensation for the taper while the vees establish the center line axis alignment.

Both setting masters and screw threads

CLEAR



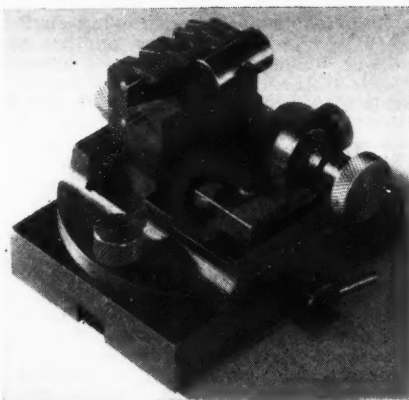
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The nameplate on your product is your signature; keeps it neat and legible! Accurate location and alignment are assured with this NAMEPLATE DETAIL PRESS.

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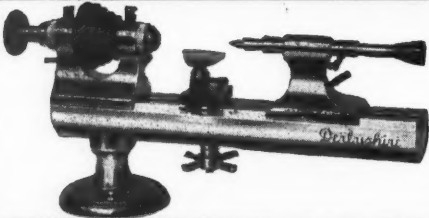


"See-All" Thread Staging Fixture

are held in the vee of the See-All Thread Staging Fixture by a quick-acting spring-loaded clamp which is adjustable for various thread lengths. Cutaway sections are provided in the positioning blocks to permit checking the ends or lengths of threads. The fixture is supplied complete with two sets of V-assemblies, 25 setting masters, specification data table, and lock type leatherette case.

"Red Ring" Combination Gear and Cam Shaft Checker

Product of the National Broach and Machine Co., 5600 St. Jean Ave., Detroit 13, Mich., the "Red Ring" Combination Gear and Cam Shaft Checker illustrated herewith is designed to perform a check of those cam shaft elements which must be held to close dimensional limits. It is now in use by one of the large auto-



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 World famous for its accuracy, dependability and fine workmanship.
 Chuck capacity .1969"
 12" Bed, Swing 3.94"
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Single adjustment changes from positive drive to light friction drive . . . prevents tap breakage.

No. 1 FRICTION OR POSITIVE DRIVE TAPPER drives 2-56 to 1/2" tap in steel or 1/2" in aluminum.

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No. 4A CAP. drives 1/2" to 2" in steel incl. pipe taps.

All units efficient as production threaders using Round Split, Button, Acorn Dies

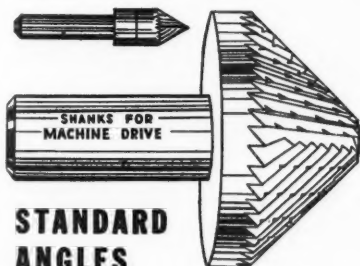
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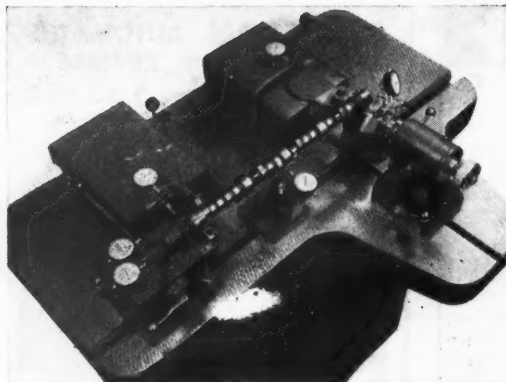
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**RADIUS TYPE
10 SIZES**

SEVERANCE TOOL INDUSTRIES INC.

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**"Red Ring" Combination Gear and
Cam Shaft Checker**

tested for composite errors and eccentricity by rolling it with a master gear. Tooth-to-tooth spacing is checked by one of the standard Red Ring gear checking heads.

The timing gear mounting flange is indicated for runout on both faces, and the dowel pin in this flange is checked for its relationship to one of the cam lobes. One of the special heads is used for indicating runout on the two center bear-

ing journals and on the base circles of each of the cams.

ing journals and on the base circles of each of the cams.

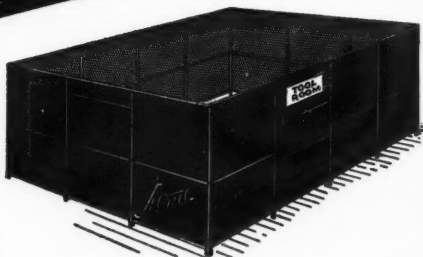
In operation, the cam shaft is laid on two journal bearing support blocks and rotated by hand, while readings are taken of the various elements to be checked. The distributor drive gear is

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Tool block hardened,
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any size bar rigid.

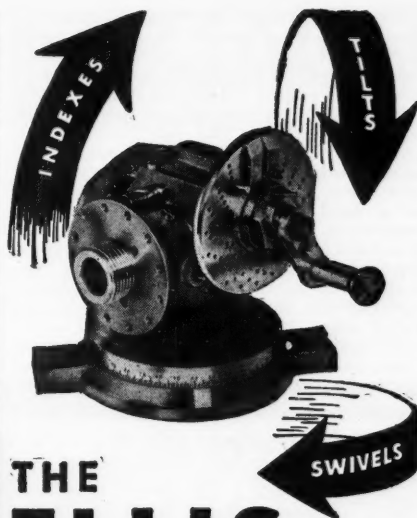
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Head No.	Body Dia.	Maximum Bar Capacity	Micro Offset	Price
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10	4"	3/4"	1/2"	70.
12	4"	3/4"	1"	45.
20	7 1/2"	1 1/2"	1"	125.
30	4"	3/4"	1 1/2"	70.
32	5 1/2"	1"	2"	115.
35	4 1/2"	3/4"	1 1/2"	85.
36	6 1/2"	1 1/2"	2"	150.

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THE ELLIS DIVIDING HEAD

Many unique features make the ELLIS Dividing Head more than an ordinary indexing fixture. It is a precise, rugged unit with 6 1/2" normal swing increased to 11" swing through the use of riser blocks. It **TILTS** more than 100 degrees in the vertical plane—**SWIVELS** 360 degrees in the horizontal plane—**INDEXES** by crank, or directly by hand. Work is held between centers, or in chucks or collets. The ELLIS Dividing Head is a universal work head that will increase the production versatility of your milling machines, grinders, drill presses and jig borers—write for complete details today.

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ducing two electrodes of the coated tubular type designated as Tungweld-C and Tungweld-F. Tungweld-C is described as a tubular, light coated electrode which contains in the tube coarse particles of tungsten carbide. The particles are deposited by the arc in the weld crater and as the weld solidifies are held in a tough iron alloy matrix. The result is said to be a weld deposit of unusual abrasion resistance. When the edge of the deposit is subjected to abrasive wear, the iron alloy and the base metal wear away, exposing the teeth-like particles of tungsten carbide, thus producing a self-sharpening edge, it is claimed.

Tungweld-C is recommended for use in

surfacing earth cutting tools when a jagged, rough, self-sharpening edge is required and for facing other tools requiring surfaces of extreme resistance to severe abrasion, such as churn bits, scraper blades, dipper teeth, oil well drilling bits, muller plows, and scarifier teeth.

Tungweld-F is a shielded arc tubular electrode containing fine particles of tungsten carbide, and is intended for use on earth cutting tools but is said to produce a smoother, thinner, and sharper edge than the rough edge of Tungweld-C. The tungsten carbide particles are so small that they will not stick out like teeth as do the coarser particles and are so close together that they are not un-

dermined by the abrasion of a blast of muddy sand, it is claimed. Tungweld-F may be used for tools that cut material such as cane and ensilage, for mixing blades, dredge cutter blades, coal cutter bits, tool joints, post hole augers, and pug mill knives and augers.

Tungweld-C and Tungweld-F are available in 14-inch lengths and in ¼-inch diameters, and are supplied in 5-lb. containers.

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Full-depth boring in
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Long tool life, expansion
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ERICKSON = Collet Chuck
Precision

Hanna 4-Way Solenoid Valve

A small, compactly made 4-way solenoid valve of the balanced spool type and controlled by a built-in solenoid pilot valve has been announced by the Hanna Engineering Corp., 1765 Elston Ave., Chicago 22, Ill. A practical manifold design permits flexibility in piping arrangement—lines may be connected to the bottom, sides, or a

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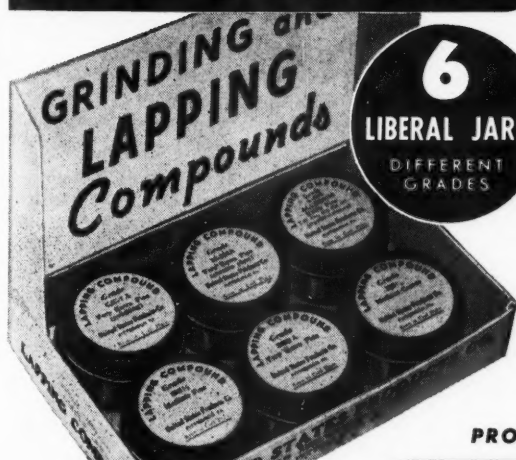


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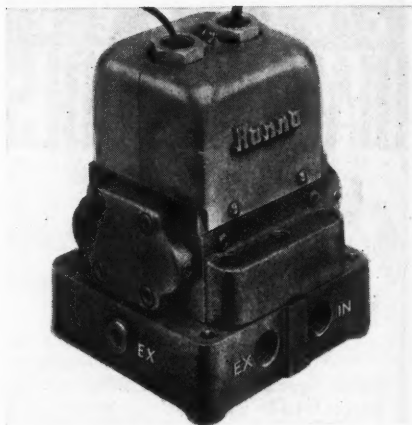
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combination of both, as desired. Three-point mounting pads are provided to prevent distortion of parts.

The Hanna 4-Way Solenoid Valve is adaptable to straight line piping, with valve capacity equal to rated pipe size. The valve and manifold are interchangeable, and the valve proper may be removed from the manifold without disconnecting pipe lines. A practical feature of the unit is the facility for removing and replacing solenoids without severing wiring connections if a cord with pin plugs is used. The spool and sleeve assembly also may be easily replaced by simply re-



Hanna 4-Way Solenoid Valve

moving end caps without moving the valve out of position.

Additional features and advantages claimed for the Hanna 4-Way Solenoid Valve include a $\frac{1}{2}$ -inch solenoid stroke, silent mechanical operation, low current consumption, and corrosion-resistant valve parts. The time required for push-button response or each stroke of the valve spool is 1/20 second.

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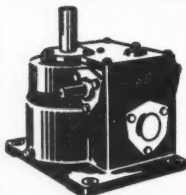
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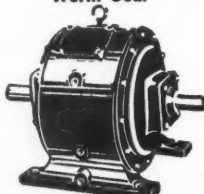
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As an addition to its "K-O" line of products, the K. O. Lee Co., 1114 First Ave., S. E., Aberdeen, S. D., announces a portable electric drill which is furnished with a keyless chuck as standard equipment. The drill is available in eight models

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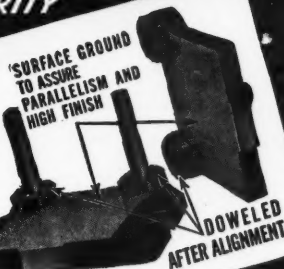
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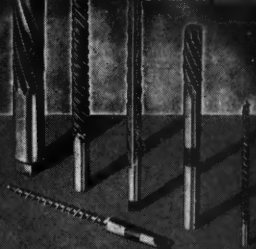
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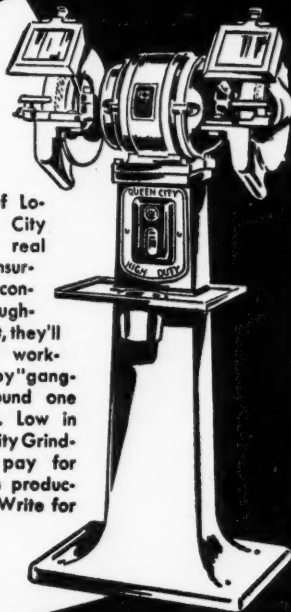
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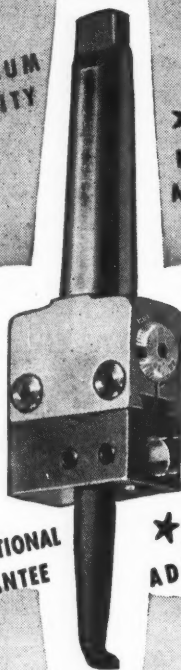
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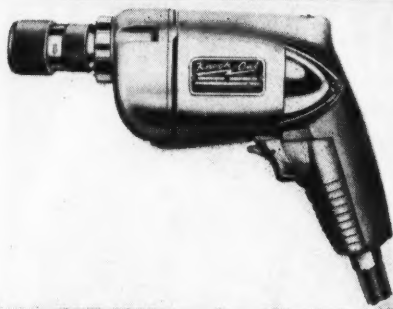
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"K-O" Portable Electric Drill with Keyless Chuck

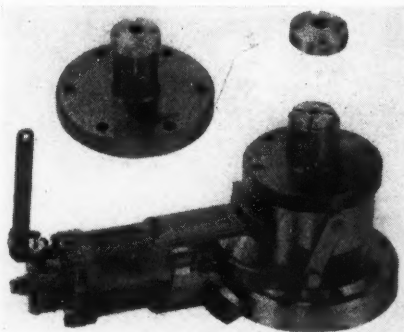
ranging from a $\frac{1}{4}$ -inch lightweight streamline unit to a heavy duty $\frac{3}{8}$ -inch model.

In addition, the company is introducing a 7-inch sander and grinder in two models (standard and heavy duty).

Zagar Internal Expanding Collet

An internal expanding collet for use in any of the company's collet chucks or in other standard collet attachments is announced by Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland 17, Ohio. Made of spring tempered tool steel, the collet is a flanged device which has a protruding section that extends beyond the flange and is split in four ways. A cone-shaped wedge through the center provides for expansion of the four sections to hold the

Illustration Showing Zagar Internal Expanding Collet, Including Its Use in a Collet Chuck





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American Drill Bushing
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workpiece internally. A collet chuck mechanism common to all Zagar standard tools is used to operate the wedge. The internal collet is fastened in place with screws and is held concentric by a round seat or product which is ground concentric with the locating surface of the expanding portion.

According to the manufacturer, the Zagar Internal Expanding Collet can be adapted to practically any make of collet attachment. An outstanding advantage claimed for the collet is that it does not move in a longitudinal manner so that overall dimensions on parts to be ma-

chined can be easily maintained. The collet is made special to the requirements of the job.

Productimeter "Y" Series Reset Stroke and Rotary Counters

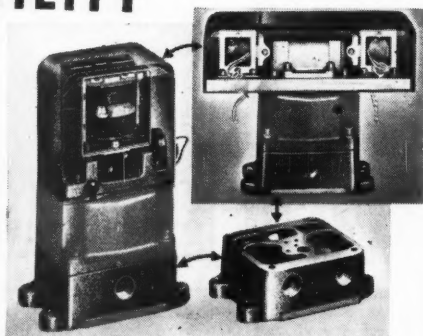
The Durant Manufacturing Co., 1932 N. Buffum St., Milwaukee 1, Wis., announces the addition of reset stroke and rotary counters, designated as the "Y" Series, to its line of Productimeter counting and measuring machines. According

to the manufacturer, the Y Series, which comprises several models that are small and compact and require a minimum of driving effort, are accurate and durable and are designed especially for incorporating as integral parts of business machines, laboratory equipment, textile machines, and metal-working production machines of all types. Both the stroke and rotary models are available in reset and non-reset styles in 3, 4, 5, and 6-figure capacities. The length of the case ranges between $1\frac{1}{4}$ and $2\frac{1}{4}$ inches, depending upon the number of figures. The width of the case is 0.960 inch and the height, 1.238 inches.

The figures on the Productimeter Y Series Counters are black on white background and are 0.166 inch high x 0.097 inch wide. They are clear, legible, and baked on the metal surface. Bearings are of the oilless automotive type. The stroke style coun-

VERSATILITY

"Plus"
IN
4 - WAY
VALVES



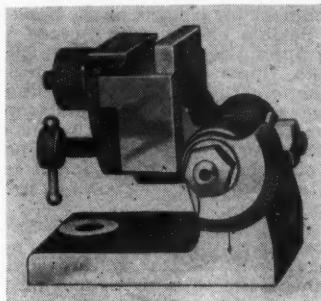
Basically, it is a single supply, single solenoid controlled 4-port, 4-way valve for straight control of double-acting cylinders. But with simple changes it can adapt itself to scores of other applications. For instance, it can provide dual supply with variation of pressure from high to low. Separate bases, bodies and solenoid structures, solenoid pilots, internal main valve parts are interchangeable. A simple modification can give you exactly the most practical air valve for your needs.

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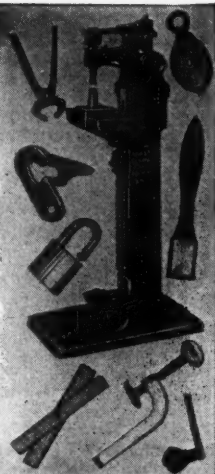
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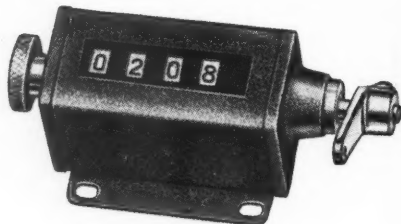
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ter has a patented ratchet, non-slip pawl drive mechanism, while the rotary style has a sleeve clutch mechanism that is said to assure positive drive and easy resetting. Shafts are of stainless steel, and the number wheels have steel



Productimeter "Y" Series Reset Stroke Counter

running parts. The Plexiglas window provided on each counter affords clear visibility and is said to be non-breakable. The operating lever on the stroke style unit is bright plated brass with a positive grip. A single turn of a knob provides for resetting of all figures to zero. Each counter is finished in an attractive black wrinkle enamel.

"Clever Saw" Attachment

The "Clever Saw," a versatile utility attachment for electric or air hand drills and flexible shafts with speeds up to 1,700 r.p.m., is announced by V-W Specialists, Upper Darby, Pa. According to the manufacturer, the attachment quickly converts the standard rotary motion of the aforementioned tools into a reciprocating action for sawing, filing, honing, and polishing. The attachment is also adaptable to small bench or pedestal drills.

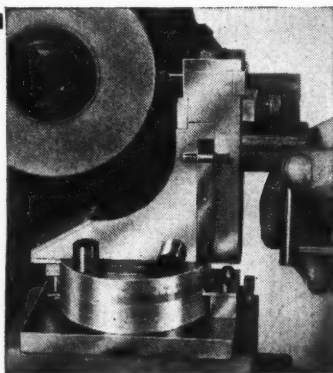
Working parts of the Clever Saw are enclosed in an oil chamber which, by centrifugal force, constantly throws the lubricant in the path of the moving parts, thus producing an oil film envelopment at all times and reducing frictional wear to a minimum, it is claimed. Being light in weight and hand size, with no obstructions to hamper freedom of use, the attachment, it is stated, allows for easy access to the work and to hard-to-get-at areas. An interchangeable collet provides for the adaptation of special trade and professional tools and instruments. All types of saw blades from 3 to 4 inches long can be used with the attachment, which provides a $\frac{3}{4}$ -inch stroke and is applicable to the cutting of plastics, rubber, wallboard, plywood, Bakelite, stain-

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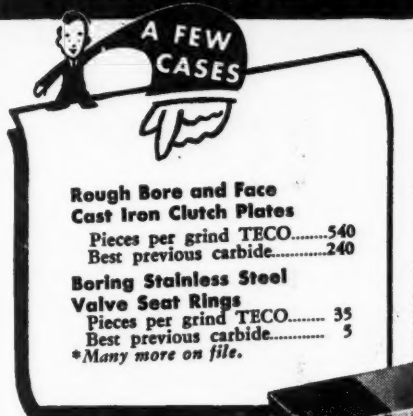
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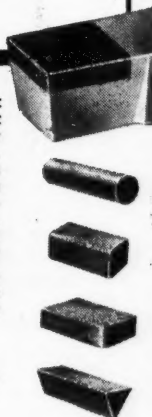
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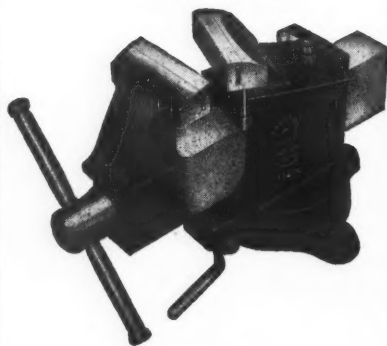
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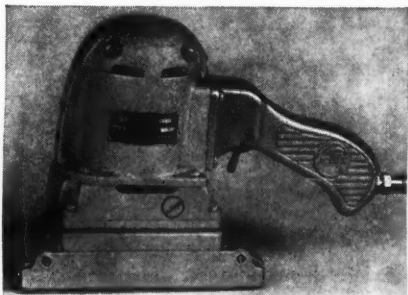
less steel, pipe, wood, corrugated metal and composition roofing, $\frac{3}{8}$ -inch black steel plate, and other materials.

Nedco Model R.O. Sanding Machine

Identified as the Model R.O., a portable electric sanding machine of the orbital type with 5,000 oscillations per minute and having a counterbalance to offset vibrations has been placed on the market by The Nedco Co., 87 Rumford Ave., Waltham 54, Mass. The sander, which weighs 7 lb., has an aluminum motor and gear case and utilizes one-third sheet of standard 9 x 11-inch sandpaper. One or several thicknesses of sandpaper can be used at one time. The pad is detachable from the machine, thus facilitating changing of pads or the use of different types of pads.

The air for cooling the motor is drawn in at the top of the vertical motor and exhausted at the bottom. Inspection plates are provided over the brush holders so as to facilitate inspection or cleaning of the brushes. Sealed ball bearings are used throughout the tool, and all gears are of the spiral tooth type and

Nedco Model R.O. Sanding Machine



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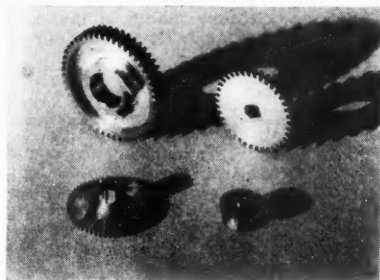
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heat treated. The motor is a universal type, operating on either a.c. or d.c. and furnished for 110 or 220 volts.

Troyke Ball Bearing Positive Station Indexing Rotary Table

A ball bearing positive station indexing rotary table for milling end clutches and a number of other jobs where station indexing is required has been announced by the Troyke Manufacturing Co., 4422 Appleton St., Cincinnati 9, Ohio. A



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drilling attachment can be supplied so that parts requiring a circle of holes can be drilled and duplicated without the use of a jig. Markers on the outside diameter



Troyke Ball Bearing Positive Station Indexing Rotary Table

of the turntable enable the operator to locate his stations easily. The turntable revolves entirely on ball bearings which are preloaded so that radial play or end play is eliminated.

The Troyke Ball Bearing Positive Station Indexing Rotary Table is made in three sizes; namely, 12, 15, and 18 inches.

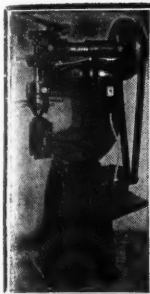
"Multilift" Rotary Magnet

A non-electric rotary magnet for use in retrieving parts from tanks, separating ferrous from non-ferrous materials, picking up steel from floors, cleaning tramp iron from conveyors, and many other purposes is now being produced under the

ASSEMBLY LINE FOLLOW THROUGH

Assembly lines simplified -- label each part with Topflight Printed Self-Adhesive Tape for code identification--omit instruction labels. Produced in rolls to fit standard tape dispensers. Easy to Apply.

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GRAY TURRET HEAD METAL CUTTER OR NIBBLER

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Most modern Nibbler for
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Rooms, Shipbuilding, Air-
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Box 596, Philadelphia, Pa.

"MULTI-PURPOSE" VISE "ADJUST-ANGLE" KNURL HOLDER SWIVEL-BASE VISE CENTERING VISE

Tools of Exceptional Usefulness
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18-inch Metal Cutting

Band Saw

For sawing tubing,
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compositions.

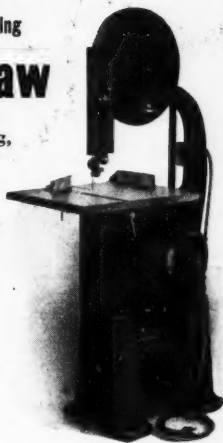
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or with low
speed geared
head motor
direct connected
to lower wheel.

Cuts straight,
circles, curves.
Finest Band Saw
of its capacity
ever built.

Write for
Bulletin 192S

OLIVER MACHINERY COMPANY

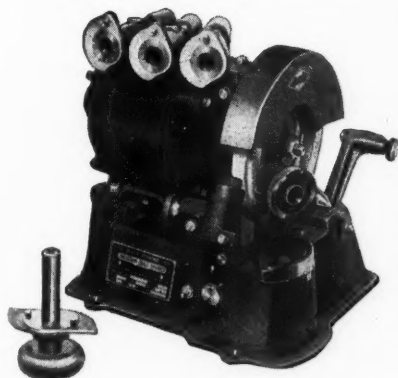
Grand Rapids 2, Mich.



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PRECISION DRILL GRINDERS FOR ALL SMALL DRILLS



It's a waste of money to use skilled labor for grinding small drills—because any unskilled person with a single Black Diamond, can produce quantities of precision ground, true centered drills with—lips of uniform length—correct angle and proper clearance for fast, precision drilling. And the Web Thinning attachment cares for all types of Notched Points to perfection.

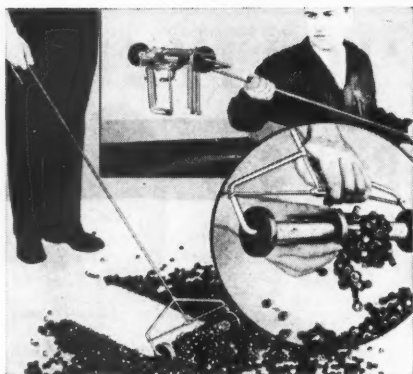
If you use quantities of small drills, singly or in gangs—you can save valuable production time, labor and money by installing a Black Diamond Drill Grinder at once.

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BLACK DIAMOND SAW & MACHINE WORKS, INC.

45 NORTH AVENUE

NATICK, MASSACHUSETTS



"Multilift" Rotary Magnets

trade name of "Multilift" by the Multifinish Mfg., Co., Dept. 447, 2114 Monroe Ave., Detroit 7, Mich. Claimed to retain its strength permanently without charging and to require no wires or electricity, the unit consists of an Alnico magnet sealed in a metal tube mounted rigidly between Neoprene wheels in a carrying frame.

In use, a handle is attached to the frame and the unit is rolled; the tube revolves with the wheels and the entire magnetic surface becomes loaded. The loading capacity of the magnet depends upon the size, weight, and iron content of the load components. Unloading is accomplished by pushing a Neoprene wiper ring to a non-magnetic area at one end of the tube where the load drops off.

The Multilift Rotary Magnet is available in sizes and materials suited to intended uses. For floors, the tube and frame are brass and the 48-inch handle is steel rod. For tanks, the exposed metal is non-magnetic stainless steel. The standard wheel diameter is 25 $\frac{1}{2}$ inches. The length of the smallest model is 9 $\frac{1}{2}$ inches, larger units being 13 $\frac{1}{2}$, 18, and 22 $\frac{1}{2}$ inches. Special size magnets are available on order.

Aero No. 5001 Universal Type Drum Wrench

Identified as the No. 5001, a universal type wrench having sprockets and lugs so placed as to fit practically all standard steel drum closures is now being marketed by the Aero Tool Co., 6930 Avalon

VIKING

INSERTED CARBIDE TOOLS with MECHANICAL LOCK

Positive, vibration-proof lock makes tool bit an integral part of holder. Cuts can be taken to full depth of carbide. Dull tools can be changed without removing holder from machine. Built-in mechanical chip breaker.

Shank dimensions from $\frac{3}{4}$ " x $\frac{3}{4}$ " x 6" to 1 $\frac{1}{2}$ " x 2" x 7". All standard turning and facing styles.

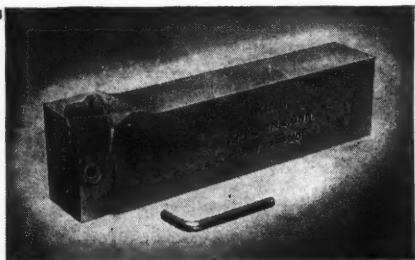
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The **COLOR** tells
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ARTUS Arbor Spacers
made of plastic in
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100 SPACERS IN ALL

$\frac{7}{8}$ " — \$3.10 $1\frac{1}{4}$ " — \$3.80
1" — 3.35 $1\frac{1}{2}$ " — 4.70

Other standard sizes also available.

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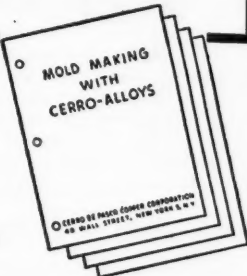
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Shims, Large Silliting Saw Spacers.

Industrial Products Suppliers
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NUMBERALL

Saves the Cost of Stamping Numbers

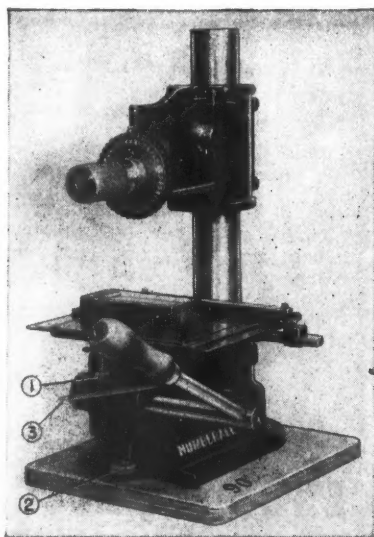


NUMBERING AND LETTERING PRESS

MODEL No. 90

This Machine is designed for the purpose of impressing letters and numbers in all kinds of articles up to 4" high, even higher if a longer column is used. It can also be used for Plates of any thickness by adjusting the Head down. Automatic spacing. Weight 48 lbs. net.

Write for Bulletin M590.



NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

Blvd., Los Angeles 3, Calif. The wrench also includes a steel lip for removing steel caps over drum closures.

According to the manufacturer, the Aero No. 5001 Universal Type Drum



Aero No. 5001 Universal Type Drum Wrench

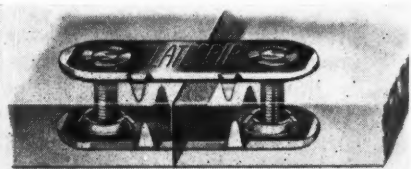
Wrench will fit male, female, and hexagon drive closures, as well as closures driven by internal lugs. The wrench which is made of cast steel and cadmium plated to prevent sparking, is 15½ inches long overall and weighs 2½ pounds.

"Plategrip" Conveyor Belt Fastener

A plate type fastener for heavy duty conveyor belts is now being offered under the trade name of "Plategrip" by Armstrong-Bray & Co., 5364-76 Northwest Highway, Chicago 30, Ill. Designed for easy application, the fastener is said to pull belt ends together into a smooth, flexible, tight joint.

According to the manufacturer, the Plategrip Fastener is made of heavy gauge steel and will withstand any load which the belt can safely accommodate. The fastener provides a smooth, flush, two-sided joint that is said to easily pass under strippers and permits the use of both sides of a belt.

The Plategrip Fastener is available for



"Plategrip" Conveyor Belt Fastener

belts from ¼ to 1½ inches thick and is supplied packaged in sets of ten of a size to a box. Companion repair plates are available for repairing tears and cuts or for inserting patches in worn spots in a belt.

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Standard slip and bracket type spindles are stocked for immediate delivery.

Made of alloy steel, heat treated and precision ground to an excellent finish.

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- Pinion Drive Shafts

SPECIAL SPINDLES

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LOW COST LOCATING BY CENTER SCOPE

Dependable Accuracy.

Ample Adjustment For Spindle Run-Out.
For Drill Presses, Lathes, Mills.



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\$24.50

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Bulletin M-12.

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9"—\$ 97.00

12"— 175.00

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18"— 235.00

18"— 365.00 Extra Heavy Duty

21"— 510.00 Extra Heavy Duty

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OUR ROTARY TABLE WILL TAKE THE PLACE OF A COSTLY FIXTURE. IT IS USED FOR ALL KINDS OF WORK ON MILLING MACHINES, SHAPERS, DRILL PRESSES AND HORIZONTAL BORING MILLS.

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Special Thread Taps & Dies. Left Hand Taps & Dies. Plug & Ring Thread Gages. Drills, Reamers, Milling Cutters, End Mills, Etc.

WE CAN ALSO FURNISH
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Catalog

LAFAYETTE TOOL & SUPPLY CO.

128 LAFAYETTE STREET

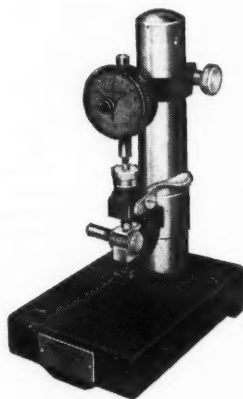
NEW YORK 13, N. Y.

Swanson Thread Comparator

Said to be useful in plants wherever an accurate, economical unit for checking threads is required, the Swanson Comparator illustrated herewith is now being manufactured by The National Automatic Products Co., 23 Whiting St., New Britain, Conn. Simple in construction, the comparator is designed to indicate at a glance whether a product is oversize, undersize, eccentric, tapered, or if lead error exists. According to the manufacturer, the indicator records work visually to accepted ring gage tolerances,

eliminating the element of human error without sacrificing accuracy.

The Swanson Thread Comparator consists of a stand with indicator (as illus-



Swanson Thread Comparator

TUMBLERS

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Cutting down, deburring, burnishing and polishing metal and plastic parts.

Specially designed Rotary Tumblers to economically deflash molded rubber products with "DRY ICE".

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WILLS RUBBER MACHINERY CO.

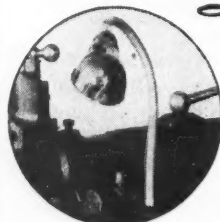
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CANTON 1, OHIO

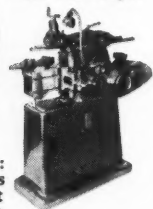
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Machine Tool Builders:
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breed extra costs by hit
or miss lighting on the
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trated) and standard thread unit. To set up the comparator, a setting plug is inserted, the upper anvil lowered with lever, and the unit swung under the indicator, thus setting it at the tolerance required. A positive swing stop provides for location of the anvil unit in the correct reading position. The gage anvils are made of high quality gage steel, fully heat treated and ground and lapped to Class 4 specifications of the screw commission standards. Component parts are of sturdy cast iron, reinforced at points of contact with precision ground steel parts and hardened and lapped to provide for maximum wear resistance.

Imported—SWISS
Collets and Carbide Bushings
FOR SWISS TYPE
SCREW MACHINES

Most fractional sizes shipped from stock.

G and D Sales Co.

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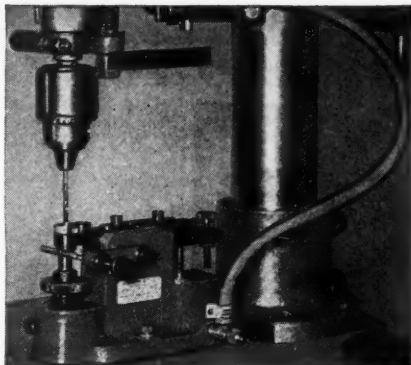
Lancaster, Pa.

POR-MATIC

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DRILLING FIXTURE

• This Universal drilling fixture is rigid, sturdy and machined to exact tolerances. It will handle round stock 1/16" to 1" and by using a special upper beam or drill bushing carrier 1 1/2" can be received for cross drilling. Special drill bushing carrier can be supplied for multiple spindle drilling also for drills 5/16" to 15/32." This fixture can be mounted on any of the regular bench type or floor type drill presses in a matter of minutes. Depending on type of material and diameter of hole size, it will increase production from 33% to 200%.



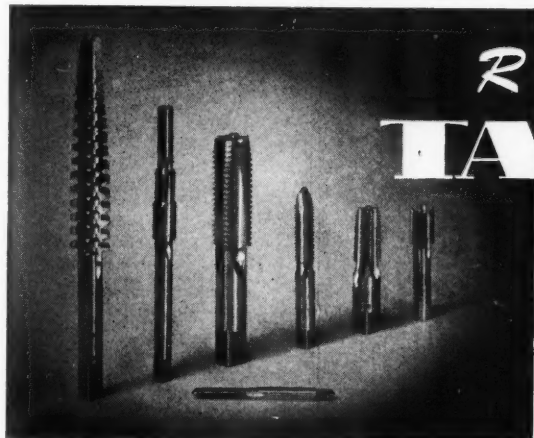
Patent Pending

Send for literature giving complete description. Agents wanted.

THE PORTER MACHINE CO.

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Accurately ground from the solid steel after hardening for long life and efficient production.

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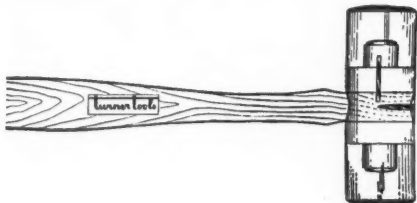
Next time try R & N Taps.

REIFF & NESTOR COMPANY

manufacturers of TAPS AND REAMERS
LYKENS, PA.

Turner Soft Faced Hammer

Incorporating a safety feature for locking the head to the handle, a soft faced hammer has been added to the line of Turner tools manufactured by the Matticks Manufacturing Co., 4156 E. Pacific



Turner Soft Faced Hammer

Way, Los Angeles 23, Calif. The Matt-Lok feature is not only said to prevent the head from twisting or turning but also supplements the wedge in preventing the head from flying off should the wedge work loose.

The Turner Soft Faced Hammer is manufactured in a variety of sizes ranging in weight from 2 oz. to 2 lb. The ham-

mer includes replaceable tips which, it is claimed, will not soften with continuous use or work loose from the head since they are press fitted.

"Shearcutter" Blind Hole Rotary Broach

Designed to produce a true Shearcutting action by virtue of end pressure and rotation of the tool or work as the former is fed into the work, a rotary broach for use in blind hole drilling has been added to the line of "Shearcutter" tools offered by the Shearcut Tool Co., Box 746, Reseda, Calif. Said to provide for unusually long life, the tool may be used in lathes, turret lathes, automatics, boring mills, milling machines, jig borers, and other machine tools for the production of holes which, it is claimed, may be held to limits of one-tenth of one thousandth inch.

The helical cutting flutes of the broach are of right-hand design, thus causing chips removed to be fed out of the blind hole and thereby making it possible to feed the broach to the bottom of the hole. The tool is sharpened on the front end and also on the helical cutting flutes. The

Economy

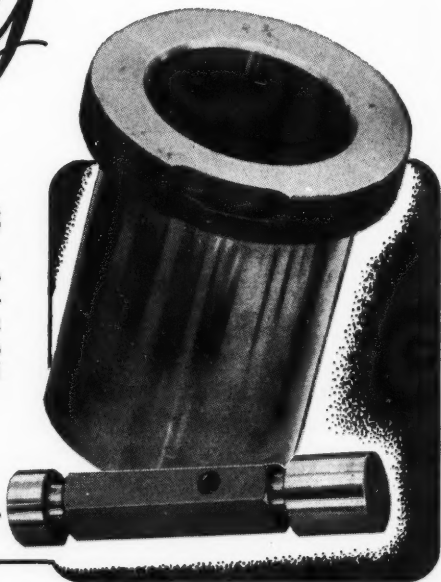
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ALL A. S. A. STANDARD types and sizes, in stock—ready for immediate delivery. Also excellent delivery on NEW GAGES and Gages salvaged by HARD CHROMIUM PLATING.

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TROYKE BRINGS
YOU A NEW POSITIVE
STATION INDEXING
ROTARY TABLE

MADE
IN
3 SIZES



This type of Rotary Table is used for milling end clutches, and where station indexing is required. Drilling attachment can be supplied so that parts requiring a circle of holes can be drilled and duplicated without use of jig. Markers on O.D. of turntable enable operator to locate stations easily. Turntable revolves entirely on ball bearings—pre-loaded so radial play or end play is impossible. Three sizes: 12", 15", 18"; moderately priced.



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Cincinnati 9, Ohio, U. S. A.

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Supreme

**LAY-OUT AND
IDENTIFICATION DYE**

12 COLORS*

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of stock and parts . . . Shows up in sharp relief—dries instantly—easily removed . . . Write for circular.

*Purple shipped unless otherwise specified.

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ADJUSTABLE
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Design of W-S Adjustable Reamers assures outstanding performance. Cuts are smooth and true to close tolerances. Generous chip clearance allows maximum stock removal.

LOWER TOOL COSTS — A new tool can be had by replacing worn blades. One piece of carbide, heavily backed with high speed steel, runs the full length of blade.

ADJUSTABLE TO CLOSE TOLERANCES — Threads ground from the solid permit close blade adjustment. Maximum expansion allows greater number of re-grinds per tool.

SIZES — Available in straight and taper shank and shell types in a wide range of sizes.

Free W. S. Catalog No. 646 Revised. Contains details and latest prices on W-S Adjustable reamers. Write: WENDT-SONIS CO., Hannibal, Mo.; 580 North Prairie Ave., Hawthorne, Calif.; 1361 West Lake St., Chicago, Ill. Warehousing Facilities: Eastern Carbide Corp., 909 Main St., New Rochelle, N. Y.



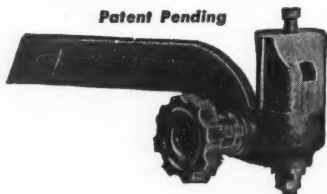
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Boring Tools • Centers • Counterbores •
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Monarch Precision SHAPLANE Radius Tools

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Four Models for

LATHES, SHAPERS, PLANERS, BORING MILLS

RANGE $\frac{1}{2}$ " To 3" RADIUS (MODEL ALSO
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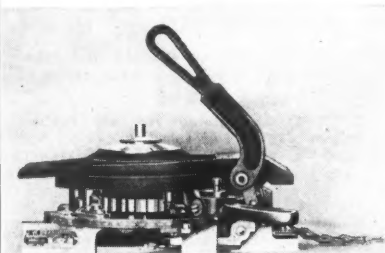
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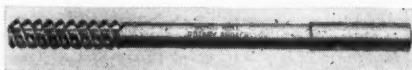


- 1.—1800 light cuts per hour.
- 2.—Either horizontal or vertical position.
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- Model D—Ratchet indexing only—1" cap.
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—Capacity up to 1"
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J. W. DEARBORN • Ansonia, Conn.

front end cutting edge is designed to remove most of the metal, leaving from 0.006 to 0.010 inch to be removed by the short sharpened taper section on the front cutting edge of the helical land. The helical lands are ground with a back taper of 0.0003 inch per inch to prevent drag and scoring of the work due to misalignment of the spindle and holder.



"Shearcutter" Blind Hole Rotary Broach

The Shearcutter Blind Hole Rotary Broach is available in sizes from $\frac{1}{8}$ to 1 inch increments of $\frac{1}{16}$ inch and from 1 to $1\frac{1}{2}$ inches in increments of $\frac{1}{8}$ inch. Broaches of special size can be obtained on order.

Stanley No. 88 Replaceable Bit Screw Driver

Identified as the No. 88, a replaceable bit screw driver for driving both Phillips and slotted head screws is announced by Stanley Tools, New Britain, Conn. The driver features a hollow handle compartment which contains three bits—two bits for Phillips screws and one bit for slotted screws. Other bits are also available to fit the holder.

The polished steel bar of the Stanley No. 88 Replaceable Bit Screw Driver is hardened and tempered. The screw cap is



Stanley No. 88 Replaceable Bit Screw Driver

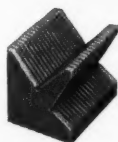
made of aluminum, and the hardwood handle is provided with an attractive natural finish.

Acromark Special Shape Name Plate Holding Fixture

To position, clamp, and quickly release special shapes of name plates for stamping with lettering or numbering, The Acromark Co., 9 Morrell St., Elizabeth 4, N. J., has developed a fixture which is adapt-

McMAHON

MAGNETIC V-BLOCKS, MAGNETIC PARALLELS, ADJUSTABLE ANGLE PLATES



Size **MAGNETIC V-BLOCKS** Price
45°, 30°, 60° — 2 1/2" x 2 1/2" x 3 1/2" \$80 per pair
45° — 1 1/2" x 2 1/2" x 4" \$50 per pair

MAGNETIC PARALLELS
1/2" x 1 1/2" x 3 1/2" \$19
1-3/32" x 2 1/2" x 4" \$22
1-3/32" x 2 1/2" x 4" \$20
1-3/32" x 3" x 4" \$30

ADJUSTABLE ANGLE PLATES
3" x 3" x 3/4" with T Slots \$30
without T Slots \$22
6" x 6" x 7/8" with 16 tapped holes \$75
without holes \$40

Manufactured by
MOHLER TOOL CO. 1403 HOLLY AVENUE
DAYTON 10, OHIO

ADVANCE CLAMPS

Cut Set-Up Time 75 %

on

JIGBORERS

THE ONLY T-SLOT CLAMP

For use on all machines with T-slots.

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ADVANCE MACHINE WORKS

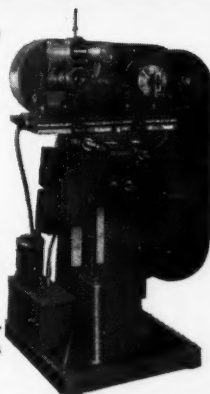
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FULL ANTI-
FRICTION
BEARING
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MACHINE

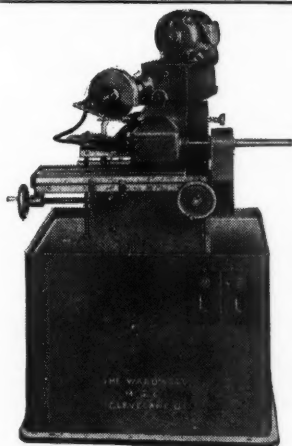


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**UNITED STATES
MACHINE TOOL CO.**

8 E. 72nd St.

CINCINNATI 16, OHIO



**THE WARDWELL
MANUFACTURING CO.**

3166 FULTON ROAD
CLEVELAND 9, OHIO

Carbide Drills Fluted from Solid

....indexes automatically

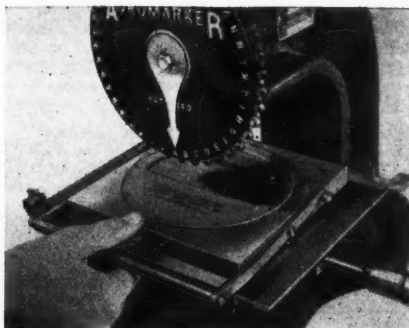
Grinds and Sharpens
Taps — Reamers
Milling Cutters — End Mills
Saws

Grinding angles up to 45°. Spiral
leads as short as 5/16" to one
turn. Sharpens saws in gangs up
to 7 3/4" long.

Write for Bulletin 90 F.S.

able to the holding of a wide variety of shapes and sizes of plates and can be used in any type of press or the Acromarker name plate stamping machine. It is furnished with a flange at the rear to fit under the stamping bar of standard machines or may be bolted into position for special applications.

In operation, the special name plate is placed flat on the fixture when the front rod handle of the lever arrangement is lifted. Upon release of the rod, spring pressure holds the plate in position assisted by four small pins that move upward and lock the plate firmly. A series



Acromark Special Shape Name Plate Holding Fixture in Use

**V PRESSES
FEEDS
AUTOMATIC
EQUIPMENT**

The V&O Press Company
HUDSON, NEW YORK

of holes in the spring pressure bar permits locating the pins to suit the shape of the special plate or plates. To remove the plate after stamping, the rod is simply lifted, leaving the name plate free to be removed by a slide motion of the operator's hand.

The fixture illustrated herewith has an overall size of 8 inches wide x 9 inches deep x $\frac{1}{2}$ inch thick but is available in other sizes to accommodate larger or smaller name plates.

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LIVE CENTERS**

- HIGH SPEED
- LONG LIFE
- HEAVY DUTY

MARVECO guaranteed to outperform and outlast any other live center. Write for free catalog. "The Marvels of Marveco."

**SEND US
YOUR CENTER
PROBLEMS**

MARVEL TOOL & MACHINE CO.
3401 E. McNichols Road, Detroit 12, Mich.

Hartmann "400" Drill Press Vise

Identified as the Hartmann "400," a 4-inch drill press vise with unusually heavy base to eliminate buckling of the frame is now being marketed by Industrial Enterprises, Inc., 201 Sixth St., Racine, Wis. Such moving parts of the vise as the center bar, guide bars, and locking mechanism are hardened and ground.

The movable jaw of the unit has a long

**Spiral Flute
COUNTERSINKS**

Aero Spiral flute HSS Co-sinks end chatter, cut clean and accurately. Stocked in 60, 82, 90, 100 degree included angle, $\frac{1}{8}$ ", $\frac{1}{4}$ " diameter, with $\frac{1}{2}$ " shank and $\frac{3}{8}$ ", and 1" dia. with $\frac{1}{2}$ " shank. If not available from your Mill Supply dealer order direct.

AERO TOOL COMPANY
6930 Avalon Bd., Los Angeles 3, Calif.



CUTTERS

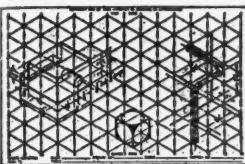
All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

CUTTER SPECIALISTS SINCE 1919.

Write today for prices. A few territories open.

QUALITY TOOL WORKS
WAUKEGAN ILLINOIS

ISOMETRIC SKETCHES ARE



EASY TO MAKE AND READ!

One trial will make you another steady user of WADE'S ISOMETRIC blue lined paper. Shows all surfaces and interior to scale.

Makes clear blueprints. Saves time daily in hundreds of plants. Write for Circular.

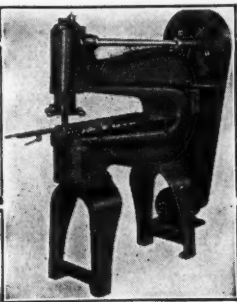
Wade Instrument Co. 1422 E. 109th St.,
Dept. H, Cleveland, O.

SAVAGE

NIBBLING MACHINE

NIBBLE YOUR COSTS

Ask for Free Bulletin "H"



Capacity $\frac{3}{4}$ " mild steel

FOR TUBE SLOTTING, TUBE SHAPING AND CUTTING FLAT SHEETS BY TEMPLATE OR TO A SCRIBED LINE.

Manufactured by

W. J. SAVAGE COMPANY

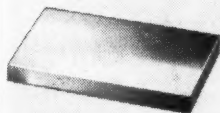
Knoxville

Since 1885

Tennessee

Pioneer Mfrs. of Nibbling Machines

**YOU'VE GOT TO BE SURE OF YOUR HARDNESS
... INSIST ON CLARK TEST BLOCKS**



Price Each: \$1.50, F.O.B. Detroit

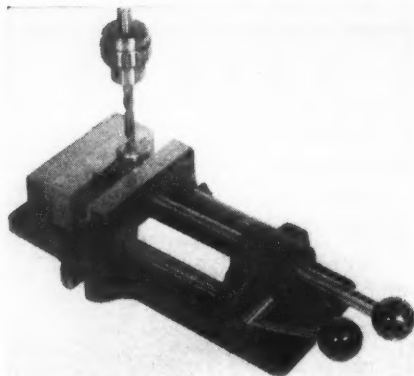
CLARK
TOMORROW'S ACCURACY TODAY
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INSTRUMENT, INC.

10200 FORD ROAD

DEARBORN, MICHIGAN

Your hardness tester is useful only when you are sure it is giving you accurate, dependable readings. You can rely on the accuracy of your hardness tester when you check it regularly with CLARK standard test blocks. Clark test blocks, in various hardness grades, provide a quick, sure, and simple method of assuring accurate hardness tester readings.



Hartmann "400" Drill Press Vise

guide to prevent it from cocking when work is locked in position. The position of the center bar (in line with the work to be held) and the placement of the crank and locking mechanism are said to further ensure accuracy and eliminate distortion of the jaws. Built-in parallels

or recessed jaws are claimed to hold the work parallel at all times. The parallels are removable and may be readily replaced when necessary. Special jaws may be built in to fit the particular jig or fixture being made.

The Hartmann 400 Vise has an opening of 7 inches and allows for a $6\frac{1}{8}$ -inch loading space. Designed to reduce loading and unloading time to a minimum, the locking mechanism is so constructed as to compensate for wear. A trigger on the lock works on an eccentric, decreasing the size of the hole around the center bar. After the movable jaw has been pushed into position, the direct and natural muscular action of moving the locking lever down results in the jaw moving slightly forward, the locking mechanism clamping the center bar and thereby exerting on the jaws the needed pressure to hold the work in position and retain it in position until the lock is released.

Weldon Tapered End Mill

A tapered end mill or die sinking cutter of the constant spiral type is announced by The Weldon Tool Co., 3000 Woodhill

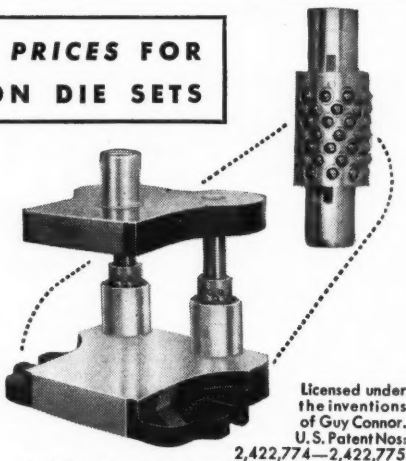
Again **NEW, LOWER PRICES FOR** **EVANS ANTI-FRICTION DIE SETS**

This third recent major price reduction is a prompt reflection of lower manufacturing costs.

Your enthusiastic acceptance of Evans Anti-Friction Die Sets has allowed us to step-up production schedules and add more time-saving machine tools. We've been able to cut costs on our latest model—and, in the American tradition, pass our savings along to you.

The new Evans *Acrolex* Die Set gives you all the advantages of anti-friction construction: increased die life... faster, more accurate production... greater economy.

Write today for your new price list and specifications for Evans *Acrolex* and *Microlex* Anti-Friction Die Sets. At their new, lower prices, *Acrolex* Die Sets are more than ever the best value your dollar can buy.

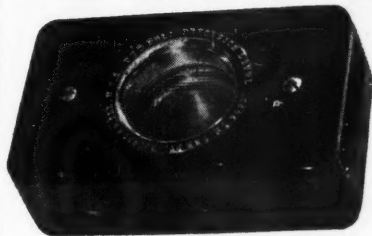


Preloaded anti-friction bearings between leader pins and bushings hold punches and dies in perfect alignment. And, they allow sets to open and close freely and easily... save assembly and try-out time... cut costly downtime.

EVANS

REAMER AND MACHINE COMPANY
NEW LEXINGTON, OHIO

"ALL-WAY" LEVEL



The Fell Precision Level shows the level of all directions at once to an accuracy of .0005 inch per foot. It saves time in the manufacture and maintenance of machinery. Made in sizes $3\frac{1}{2}$ " x 6" and $5\frac{1}{2}$ " x 12", also 4" and 5" dia. for permanent mounting.

Write for Information

WM. B. FELL CO.

320 McLAIN AVE.

ROCKFORD, ILL.



SPECIAL
\$19.50

V-425 MILLING MACHINE AND DRILL PRESS VISE

with these features that meet your most exacting requirements:

- Swivel base calibrate in 90-0-90° of rotation.
- Jaw width, 4 inches. • Jaws provided with hardened steel, replaceable plates. • Vise openings, $2\frac{1}{2}$ ", depth 1". • Removable semi-steel handle and heat treated clamping screw. • Base and body cast of semi-steel; all surfaces not machined are finished in a baked wrinkle finish. • 4 slots properly secure vise to the machine. • Rigid construction reduces chatter and assures long cutter life.

Send your order to DEPT. MM.

THE ERWOOD COMPANY

214 WOODSTOCK STREET
CRYSTAL LAKE, ILLINOIS

Improve Product *Quality* Without Re-tooling

Without changing design, re-tooling, changing materials or incurring major expense or delay, many manufacturers are improving the quality and performance of their products — are eliminating chatter, binding, loosening, leakage, thread stripping, etc. — by torquing all critical nuts, bolts, screws and threaded parts.

With STURTEVANT permanently Accurate Torque Wrenches you can assemble to close tolerances of torque, can avoid over stressing and damaging strains. As easy to use as an ordinary socket wrench, Sturtevant Sensory (High Speed Production) Wrenches save assembly time while improving product quality.

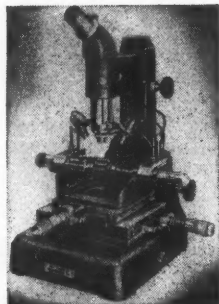
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SW-18



P.A. **STURTEVANT CO.**
ADDISON [QUALITY] ILLINOIS

SCHERR aids to precision — production

Low-priced toolmakers' microscope

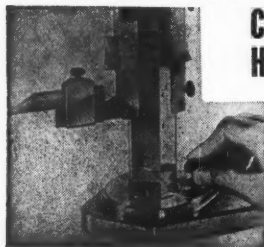


The WILDER

Here it is at last—a precision checking tool that every shop needs, at a price that any shop can afford. Measures two ways with micrometer to .0005", or with gage blocks for closer accuracy. The image is on a clear glass reticle for maximum definition. Has understage lighting for shadow image, and surface lighting for reflected lighting.

image. An essential instrument in today's precision demands, at a most interesting price. Write.

Will not shift while measuring . . .



CHESTERMAN HEIGHT GAGE

A big stabilized instrument. Fine adjustment by screw operated from base eliminates movement of instrument while measuring. Finger pressure on two lugs frees split nut for

rapid vertical adjustment of head. $2\frac{1}{2}$ " vernier in place of the normal $\frac{1}{4}$ ", provides visibility without need of magnifier or removing gage from work. English and metric readings. In sizes from 12" to 48"—capacities sufficient for the most unusual measurements.

An inexpensive SINE BAR

Thoroughly normalized for undeviating accuracy. Two sizes — $1\frac{1}{2}$ " x $\frac{1}{4}$ " x 5",

Price — \$19.00 ground —

\$26.00 lapped, and 1" x

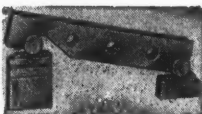
$1\frac{1}{4}$ " x 5", Price — \$26.00

ground — \$36.50 lapped.

Extremely low price

makes this valuable tool

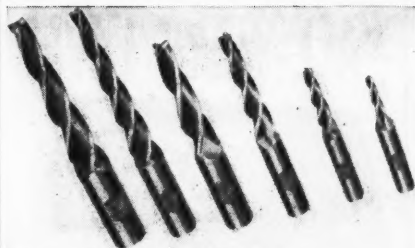
available for the individual owner as well as in quantity for the toolroom.



Write for full details on these tools, and for the Scherr Small Tool Catalog.

GEO. SCHERR CO., Inc.

192-A Lafayette St. New York 12, N.Y.



Weldon Tapered End Mills

Rd., Cleveland 4, Ohio. Said to be ideal for use in the manufacture of molds and dies, the tool, as a result of its three-flute design with constant spiral, is claimed to ensure free, rapid cutting.

Available with a $\frac{1}{4}$, 1, 2, 3, 5, or 7-degree taper on the side, the Weldon Tapered End Mill is regularly furnished with a straight shank for use in Weldon holders or may be used with draw-in collets. Special spiral tapered end mills to meet individual specifications can also be obtained.

Bonney Pliers Set No. 14

Identified as the No. 14, a small pliers set designed particularly for ignition, starter, generator, carburetor, and instrument work has been announced by the Bonney Forge & Tool Works, Allentown, Pa. The set consists of one flat

Bonney Pliers Set No. 14





DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
 Wilmerding, Pa.

CAMS

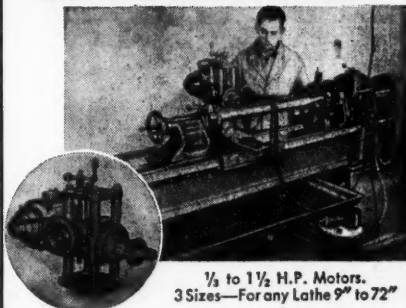
Our ROWBOTTOM cam cutting facilities are at your disposal for your cam requirements.

Let us have your inquiries.

BLOOMFIELD TOOL CORP.

37 FARRAND ST. BLOOMFIELD, N. J.

KEYWAYS A Foot A Minute With A MASTER CONVERTER



$\frac{1}{2}$ to $1\frac{1}{2}$ H.P. Motors.
 3 Sizes—For any Lathe 9" to 72"

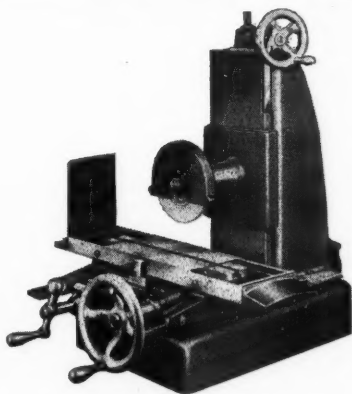
Capacity: 1 Cu. In. Metal Per Min. Per H.P.

BASIC MILLER and 7 Interchangeable HEADS THE MASTER LATHE CONVERTER

The world's most versatile auxiliary machine tool. Result of 14 years of designing, engineering and building multi-purpose milling and grinding attachments. Also does internal keyseating, drilling, reaming, boring, thread milling and hundreds of other metal working jobs. *Maximum Performance, Minimum Cost.* Write for Descriptive Literature.

MASTER MANUFACTURING CO.

1302 East Avenue "A" Hutchinson, Kan.



Thornton

MECHANICAL LABORATORY

NEW BRITAIN, CONNECTICUT

TML

HAND FEED PRECISION SURFACE GRINDER

Quick and easy in operation. The platen can be moved by one finger.

Grinds 12 in. long x 6 in. wide x 9 in. over platen. 7 in. dia x $\frac{1}{2}$ in. face x $1\frac{1}{4}$ in. hole wheel.
 Motor $\frac{1}{2}$ or $\frac{3}{4}$ H.P.

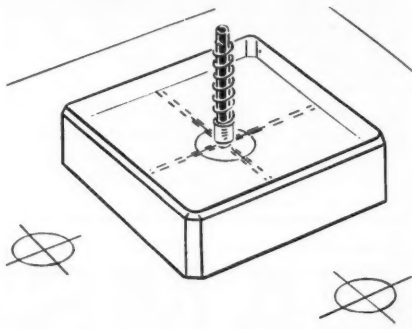
Precise control for precise work.

nosed pliers, one short chain nose pliers, and one diagonal cutting pliers, all contained in a handy leatherette kit. Each of the pliers measures a total of 4 inches in length.

"Vis-u-line" Center Punch

A center punch to be known as the "Vis-u-line" is now being marketed by Unico, Huntington, N. Y. A transparent plastic block $2 \times 2 \times \frac{1}{2}$ inch, supports the 1-inch steel punch at right angles to the

work. The block is clearly marked with broken double cross lines for easy alignment. A tap on the punch provides for



Drawing of "Vis-u-line" Center Punch

marking of the true center of the cross lines, the punch returning to its original position in the hand tool.

CARROLL DIVIDING HEADS



3 SIZES - 4 MODELS - 6" to 12"

TROYKE MFG. CO.

4422 APPLETON ST. CINCINNATI 9, OHIO

AWAY WITH Oversize and Bell-Mouthed Holes!



The most common cause of bell-mouthed and oversize holes is simply misalignment of the spindle with the work. By automatically compensating for such inaccuracies up to $1/32$ " radius, or $1/16$ " diameter, the Ziegler Holder makes it so easy to turn out perfect work that it is almost unbelievable. Try it and see!

W. M. ZIEGLER TOOL CO.

1928 Twelfth St., Detroit 16, Mich.

Ziegler
ROLLER
DRIVE

WRITE FOR
CATALOG

FLOATING HOLDER
for Taps and Reamers...

U. S. Air-Operated Slide Feed

A self-contained air-operated slide feed which can be used with all types of fabricating machines and can be readily moved from machine to machine is announced by the U. S. Tool Co. Inc., Ampere (East Orange), N. J. The feed can be used semi-automatically or it can be readily made fully automatic through the incorporation of suitable interlocking type switches.

According to the manufacturer, practically unlimited feed lengths may be obtained with the U. S. Air-Operated Slide Feed by making a multiple of strokes with the feed timed to coincide with a

Save Time With RADIUS DRESSER

Thousands of Somerset Dressers in service. Offer outstanding features—Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90° either direction. Wearaver bearing is dustproof.



Write for
Illustrated folder.
Immediate Delivery.

SOMERSET TOOL CO.
320 Virginia St. Hillsdale, N. J.

If you're looking for
"PRODUCTION DIVIDENDS"

HUB HIGH SPEED POWER PRESSES

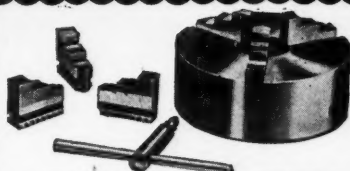
NEW HIGH SPEED fully automatic press
with self contained stock dispenser.

- Feed 0-8"
- Stock Straightener
- Variable Speeds — 60-240 strokes per minute
- Stock Dispenser
- Capacities: 4½ to 27 ton
Manual or Automatic

OBI Demonstrators now available at 25 DOALL offices throughout the U. S., Mexico and Canada. Investigate the money saving discounts on these machines at your nearest DOALL office.

William F. Brewer
MACHINE COMPANY

75 Laurel St., Hartford 6, Conn.



THREADED LATHE CHUCKS

Mount directly on 1½-8, 1-8, 1-10 lathe spindle
without adaptor.

UNIVERSAL MODELS 4" thru 6"
INDEPENDENT MODELS 3" thru 10"

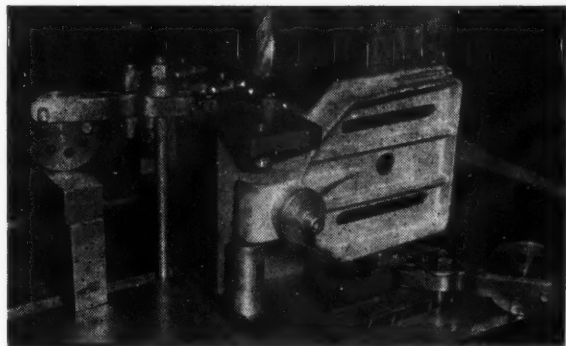


Falls
for
ECONOMY
with
PERFORMANCE

FALLS PRODUCTS, INC.

124 Genoa St.

Genoa, Ill.



INSTANTLY ADJUSTABLE WORK HOLDER CLAMP

Patents Pending

FOR USE ON:

Milling Machines, Power and Hand
Punch Presses, Drill Presses, Planers,
Boring Mills, Grinders, Shapers,
Jig Bore, Lathe Face Plates,
Jigs and Fixtures.

TIME-SAVING, Compact, Pays for itself the very first time it is used.

No more searching for shims and blocking materials. Clamp will instantly level to ANY HEIGHT desired. No other clamp can outperform this new tested product. Holds the work with great pressure, a practical marvel in simplicity and usefulness for any plant or shop.

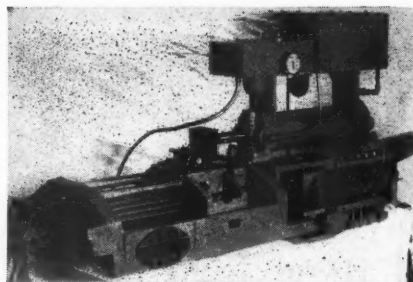
By inserting one or both pins in the round disc holes, different clamping heights are instantly obtained to suit the work to be clamped.

Available in the 3½" diameter
Disc Size with 7½" long Clamping
Arm. Adjustable from 0 to
2½". By using blocks under the
round disc, any clamping height
may be obtained, still retaining
the fine instant adjustment desired.

Price \$3.80 F.O.B. Essex, Conn.

Distributors for this exclusive
product wanted in all States.

THE AMERICAN PRODUCTS COMPANY, **BOX 113,
ESSEX, CONN.**



U. S. Air-Operated Slide Feed

stroke of the fabricating unit. Accuracy can be controlled to 0.002 inch at each stroke of the feed, it is claimed.

Airco Silicon Bronze Electrode

The Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y., announces the availability of a silicon bronze electrode which may be used for the welding of silicon bronze base metal, copper, and for joining galvanized iron and silicon bronze to steel. It is said to be particularly appli-

cable to the manufacture of chemical and food processing equipment, sewer disposal equipment, and hot water tanks.

Advantages which are claimed to be offered by the Airco Silicon Bronze Electrode include the following: (1) soft, spray type, shielded arc action; (2) very low spatter loss; (3) unusually free flowing, dense deposit; (4) very easy slag removal; (5) crack-free welds; (6) unusually smooth deposits; (7) all-position welding; and (8) ability to weld silicon bronze, copper, iron base and dissimilar metals. The electrode is available in five diameters ranging from $\frac{3}{32}$ to $\frac{1}{4}$ inch and in lengths varying from 11 to 18 inches.

Wendt-Sonis Inserted-Tooth Milling Cutter

An inserted-tooth cutter which is said to embody unusual techniques in milling cutter design has been developed by the Wendt-Sonis Co., Hannibal, Mo. Equipped with right-hand cutting blades as standard, the same cutter body can be used as a left-hand cutter by inserting a set of left-hand style blades.

The blade-holding fixture of the cutter



A Complete Line

— 6" to 12" wheels —

BENCH and PEDESTAL TYPES

Rugged---for heavy-duty service Precision-built for precision work

SHOWN HERE. BALDOR Grinder, Catalog No. 7120. Heavy-duty, $\frac{1}{2}$ hp., ball-bearing, Capacitor Type motor; 60 cy., 3400 rpm., 7"x1" first grade Vitrifired Bond wheels, $\frac{5}{8}$ " arbor.

Large, adjustable tool rests **\$58.00**

IMMEDIATE SHIPMENT — ALL SIZES

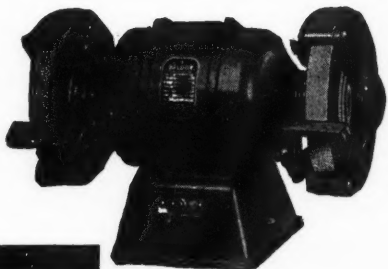
BALDOR ELECTRIC COMPANY

4380 Duncan Ave.,

St. Louis 10, Mo.

ASK FOR BULLETIN 321-C

ON COMPLETE LINE



AUTOM



CONTINUOUS HINGES

Manufactured by
**AUTO MOULDING
& MFG. CO.**

WRITE FOR STOCK LIST

1114 E. 87TH ST.

CHICAGO 19

*Interchangeable
type and holders
for every
marking
need*



*Ask for
Catalog
5-45*

NEW METHOD

Steel Stamps INC.

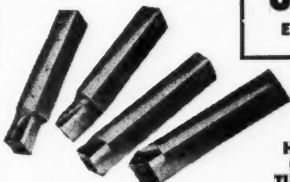
147 Jos. Campau

Detroit 7, U. S. A.

**Save REAL MONEY
on these EASTERN
Tool Bargains!**

**• CARBIDE TIPPED
TOOL BITS**

**80¢
EACH**



**HIGHEST
GRADE
TUNGSTEN
CARBIDE
ONLY!**

$\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ",
 $\frac{7}{16}$ ", $\frac{1}{2}$ "

• Available in any size,
any shape, in Right
Hand, Left Hand, Round
and Square Nose.

UNUSUAL VALUE!

• NEW . . .

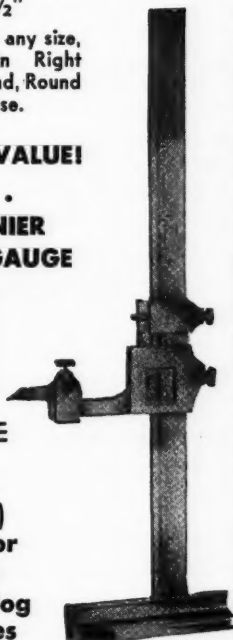
**18" VERNIER
HEIGHT GAUGE**

**OUR PRICE
\$60.00**

**YOU SAVE
\$70.00
(Supply
Limited!)**

**• Send for
FREE**

**Tool Catalog
128 Pages**



**EASTERN Tool Supply Company
178 Grand St., New York 13, N. Y.**



Wendt-Sonis Insert-Tooth Milling Cutter

is designed for quick and accurate blade setting and for firm holding of blades in position. The rigid cutter body is precision built, with added weight to ensure maximum power in the cut. Each style of the cutter is said to have the type of mounting best suited for a safety in operation and accuracy in machining. A C-arbor mounting is available for the 6-inch cutter and a direct mounting for the 8-inch cutter.

L & R "Solderzit" Metal Solder

Designed to facilitate electrical, radio, and other soldering repair jobs in the plant or home, a ready-to-use metal solder to be known as "Solderzit" is now being introduced by the L & R Manufacturing Co., 577 Elm St., Arlington, N. J. Packed in a convenient tube, the prod-

Lathe Collets



Precision Steel and Brass Collets for South Bend Lathes or other makes of lathes or machines that they will fit.

Collet No.	3	2	4	5
Max. Cap. In.	1/2	11/16	3/4	1
Thread Dia. In.	.850	.955	.950	1.250
Thread Lgh. In.	3/4	13/16	13/16	3/4
Threads Per In.	26	20	20	20
Body Dia. In.	.6495	.6595	.6495	1.2495
Collet Lgh. In.	2-11/16	3-5/16	3	3-9/32
Head Dia. In.	.852	1.095	1.150	1.452
Head Taper Deg.	12	15	10	10
Prices				
Postpaid	Steel \$3.75 Brass \$2.00	\$4.00 \$2.25	\$4.25 \$2.35	\$4.75 \$2.50

SOUTH BEND LATHE WORKS
427A E. Madison St.
South Bend 22, Indiana

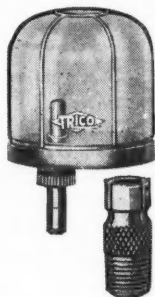
uct is described as an all-purpose high-strength metal solder that contains its own flux.

To use, the surfaces to be joined are cleaned and Solderzit is applied and heated with a soldering iron, torch, or match flame.

Trico Offset-Mount Unbreakable Thermal Oiler

Especially designed for installation where space between the oil hole and machinery is very limited, an automatic oiler for solid, wick, or waste-packed bearings is now being marketed by the Trico Fuse Manufacturing Co., 2948 N. 5th St., Milwaukee, Wis. The off-center feed spout of the unit is said to allow for mounting where the clearance is as small as 3/4 inch.

The Trico Offset-Mount Unbreakable Thermal Oiler is designed so that on the slightest temperature rise a few drops of oil are discharged, with the feeding automatically stopping as the oil cools the bearing. According to the manufacturer, the operation is constant and positive, with filling of the always-visible unbreakable plastic reservoir the only action necessary. The oiler is available in 1, 2, and 4-ounce sizes and is supplied complete with a 1/2-inch pipe thread adapter. All metal parts of the unit are bright cadmium plated.



Trico Offset-Mount Unbreakable Thermal Oiler

KASENIT

SURFACE HARDENING COMPOUNDS FOR IRON AND STEEL

DEPENDABLE • NON-POISONOUS • EASILY APPLIED

DESCRIPTIVE BOOKLET, PRICE LIST AND SAMPLE SENT ON REQUEST.

KASENIT CO., BOX D

799 GREENWICH ST.

NEW YORK 14, N. Y.



New Films

Cutter Bit Grinding Film

A 16 mm. colored sound film, "Grinding and Use of Basic Lathe Tool Cutter Bits," has been announced by the South Bend Lathe Works, 386 E. Madison St., South Bend 22, Ind. Film III in the series of films based on the book "How to Run a Lathe," it shows the various steps necessary to properly grind and use cutter bits for lathe operations such as threading, facing, boring, forming, turning, cutting-off, and so on. The film is distributed on a free loan basis and is also available for outright purchase.

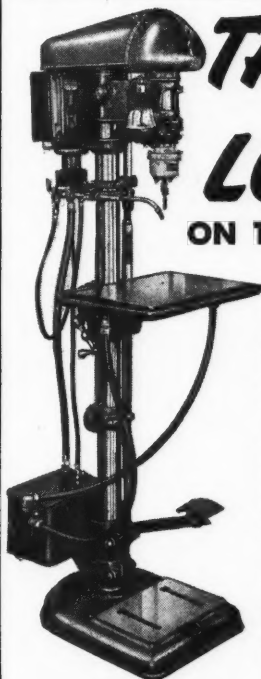
Professionally produced in full color under the direction of expert machinists and experienced educators to provide an effective and accurate instructional medium, the film shows in detail and explains each step in the grinding of various types of cutting tools. Each type of cutting tool is shown in use and proper alignment with the work emphasized. Thread cutting is shown step by step from the thread tool grinding, through setting up the lathe, and starting and finishing the thread.

Other films available in this series are: Film I, "The Lathe," which shows what the lathe is, what the lathe is for, and how its various parts work; and Film II, "Plain Turning," which shows each operation required to machine a straight cylindrical shaft between centers.

All films in the series are 16 mm. full color with sound track and are approximately 800 feet in length. The running is about 20 minutes for each film.

Casting Film

"Precision Investment Casting" is the title of a 16 mm. sound motion picture in full color produced by Allis-Chalmers which portrays and explains the various steps involved in this recently developed metal forming process. Scenes in the process have been filmed in the com-



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Driv-Lok Pin, a driving pin with flutes that provide a resilient and positive self-locking element, is illustrated and described in a four-page two-color leaflet issued by the Driv-Lok Pin Co., Sycamore, Ill. A price list of the various sizes and types of pins is included, as well as several illustrations showing typical applications of the pins. Copy free.

Doerr Motors. Electro Machines, Inc., 68 N. 3rd St., Cedarburg, Wis., now has available a catalog which illustrates and describes 3-phase a.c. motors, $\frac{1}{2}$ to $1\frac{1}{2}$ h.p., 3,450 to 860 r.p.m. constant speed; general-purpose capacitor-start motors, $\frac{1}{4}$ to 1 h.p., 3,450 to 1,140 r.p.m.; and fan duty single-phase motors, $\frac{1}{20}$ to $\frac{3}{4}$ h.p., 1,725 to 850 r.p.m. Mounting dimensions of the various motors are included. Copy free upon request.

Kasnit Surface Hardening Compound for use on all classes of steel, as well as cast, wrought, or malleable iron, in open hearth hardening, is the subject of a 16-page pocket-size booklet prepared by the Kasnit Co., 799 Greenwich St., New York 14, N. Y. Included is information on open hearth hardening, tests of hardness and toughness, and particulars regarding Kasnit case hardening compounds, including their use. A table presenting a comparison of thermometric scales, as well as tables listing heat temperatures and colors for hardening and the melting points of metals, is also provided in the booklet, copy of which is available free upon request.



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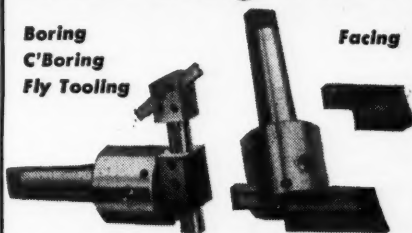
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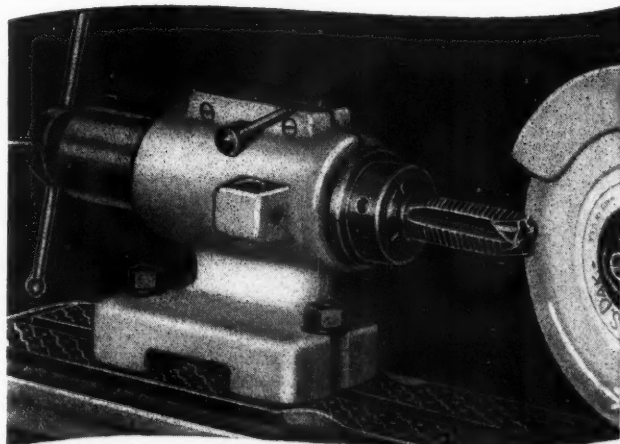
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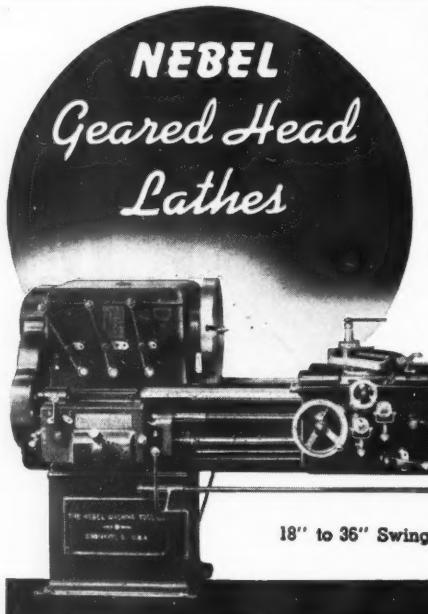
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Hoffman Flotation Units for clarifying soluble oil coolants are pictured and described in a four-page two-color folder issued by the U. S. Hoffman Machinery Corp., Filtration Division, 219 Lamson St., Syracuse 6, N. Y. The folder covers the construction, operation, outstanding advantages, and specifications of the equipment. Copy free upon request.

Rusnok Mill Head which, when installed on the overarm of a horizontal mill, converts the machine into a vertical mill that can be quickly reconverted to a horizontal mill is fully covered in a 16-page two-color catalog issued by the Rusnok Tool Works, 4840 W. North St., Chicago 39, Ill. Questions and answers regarding the attachment are provided at the beginning of the catalog and are followed by illustrations showing a cutaway view of the head, its installation, operation, and application. The various parts comprising the unit are individually described and illustrated, and special brackets for use with the head are also shown and explained. A table of specifications on the mill head is included in the rear of the catalog, copy of which is available free upon request.

Ampco Resistance Welding Electrodes and Alloys are covered in a 28-page three-color bulletin released by Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 4, Wis. Revised throughout to present an enlarged and up-to-date listing of electrodes and accessories available, the bulletin covers newly designed water-cooled ejector type holders, welding tips, welder wheels, welding dies, and other accessories. Copy of Bulletin No. 68C free upon request.

U. S. Tool General Catalog. The U. S. Tool Co., Inc., Ampere (East Orange), N. J., has released a 20-page two-color general catalog illustrating and describing the U. S. Multi-Slide, a high speed automatic machine for the economical production of stampings from coil stock; U. S. Multi-Miller, designed for milling operations on small parts requiring extreme accuracy and intricate cuts; and U. S. Automatic Press Room Equipment, including slide feeds, stock straighteners, roll feeds, two-way wire straighteners, automatic coil cradles, power driven straighteners, stock reels, and automatic stock reels. Copy free upon request.



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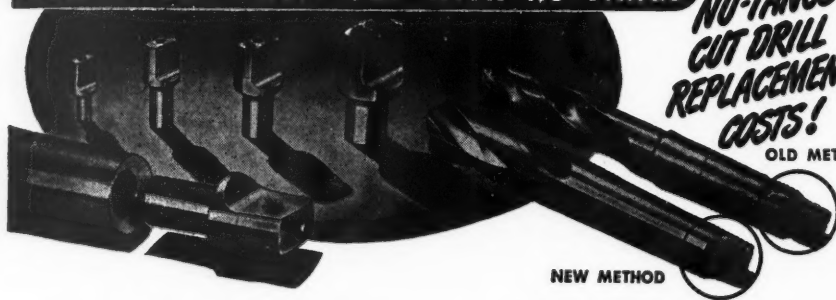
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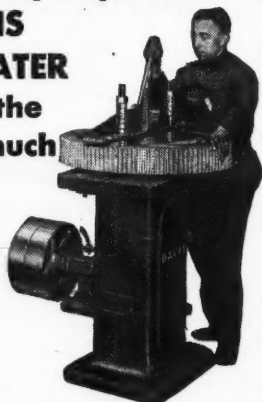
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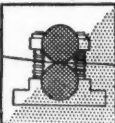
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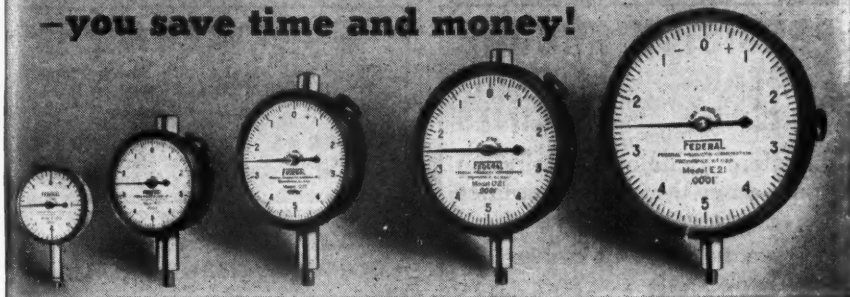


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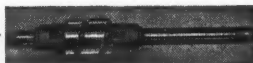
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Tests for Truth—Truth vs Myths About Profits. By George H. Cless, Jr. Published by The Eddy-Rucker-Nickels Co., Harvard Square, Cambridge 38, Mass. Price, 50 cents.

"There is nothing in this country more democratically decided than are the profits of business" declares the author of this book, widely known economic historian of Lexington, Massachusetts. Mr. Cless takes the offensive in his book; he explodes the myths surrounding the term

"profits"; he tells why the American worker earns more than any other worker in the world; and he explains by citing fact after fact that profits today are wholly inadequate to provide for America's future production tools and still keep pace with our growing population.

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Guest Editorial

By LAWRENCE A. APPLEY, President
American Management Association

ADDRESSING the 16th Annual Industrial Relations Conference at Princeton University on the evening of September 16, James D. Wise, President of the Bigelow Sanford Carpet Company, said, "It is not putting it too strongly to say that good industrial and public relations are Democracy's ticket to the last boat." In the course of his address he had pointed out that we do not need to spend a great effort in the development and perfection of new methods and techniques of personnel administration. We already have enough to do the job required to save our private enterprise system, if more people would learn their use and apply them with diligence and sincerity.

Private enterprise might not weather economic chaos. This is no alarmist thinking; it is in dead earnest. The result of another prolonged period of unemployment, bankruptcies and bread lines could mean that this nation will emerge with a different political, social and economic system.

This need not be a source of concern if rational and intelligent analysis can provide you and me with another system which would give this nation the great cultural and material standard of living which we now enjoy. There is no such system now, however, and I am sure that most of us would regret the years of experimentation we would have to go through to find one. The private enterprise system inherent in a Democracy can give us more than we have enjoyed to date. We know that. All we have to do is to operate it toward that end.

The means are at our command. The methods and the techniques have been discovered and tested successfully. All that is needed is to increase tangibly and rapidly the size of that group of progressive managements that is doing a constructive job of improving industrial relations by increasing the appreciation of human values, the human understanding between individuals and groups of individuals, and thereby the individual productiveness of their organizations.

We are actually entering that era when the tools of good personnel administration become the tools which the line executive uses to get the operating job done. Physical resources and human resources will no longer be subjects of independent and separate considerations. One can no longer be separated from the other. Effective handling of physical resources will be dependent upon management skill in dealing with human resources.

When a management, from the top to first line supervision, puts in the same amount of time, effort and skill into the inventory of personal qualifications as it does into the proper evaluation of its physical resources, the result is nothing short of astounding.

America is what it is today because we have made more effective use of human energy than any other people in the world, at any time or in any place. We will maintain our position only by increasing our utilization of human energy. The only way we can do that is by an intelligent knowledge of what human resources we have and of methods by which we can increase their individual productiveness. This can be maintained only through the rapid and broad growth of greater understanding of human values, and of the use of media for increasing our knowledge of people and our understanding of them.

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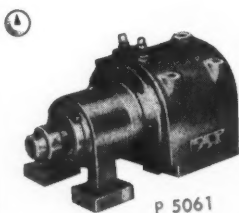
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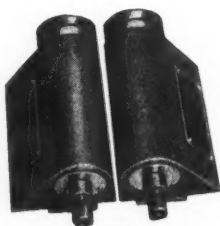
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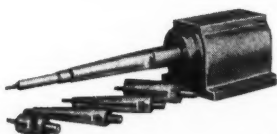
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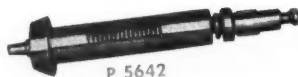
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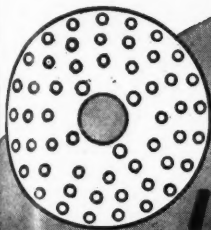
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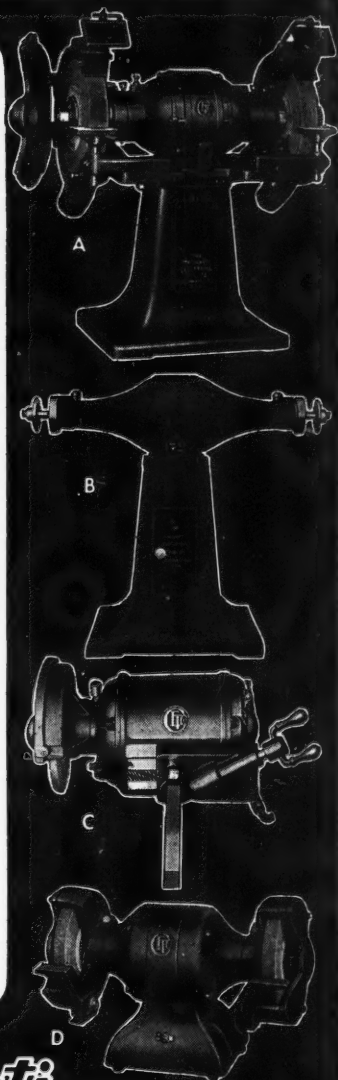
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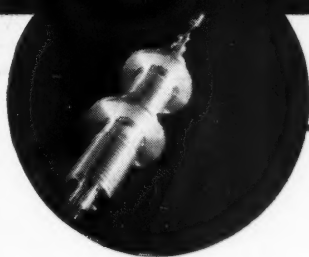
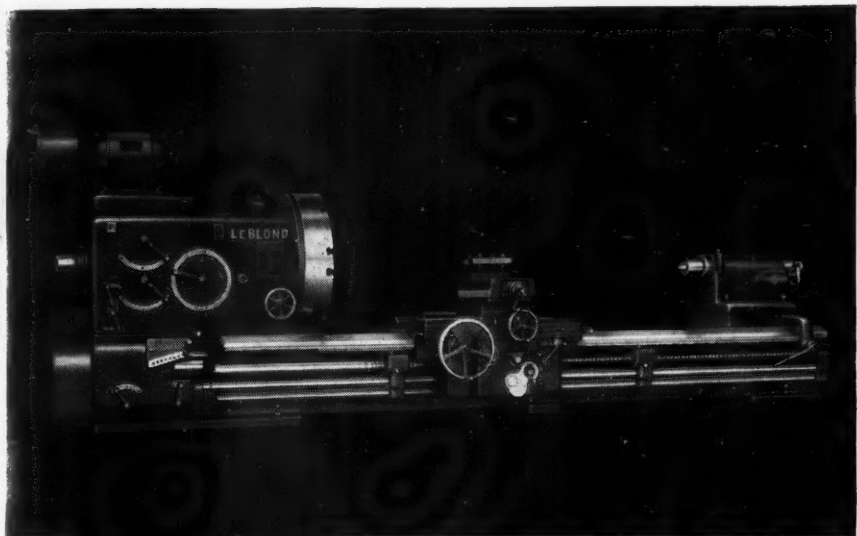
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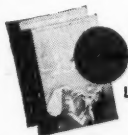
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